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THE

Fire Brigade Handbook:

A MANUAL

ON

THE ORGANISATION AND EQUIPMENT

OF

FIRE BRIGADES

For the use of Volunteer Firemen and Others

BY

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PREFACE TO FIRST EDITION.

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In presenting this Handbook of Elementary Instructions for the use of firemen belonging to Volunteer and Private Brigades, I must disclaim any intention of attempting to instruct professional firemen in the performance of their duty.

There are always in this country, under our present unsatisfactory fire arrangements, gentlemen who, having voluntarily undertaken the protection of their town from fire, are desirous of acquiring the knowledge which will enable them to take command of their Brigade and to direct its operations with efficiency

My chief object is to furnish such readers as these with the information they require in a readily accessible form I have endeavoured to collect within the covers of this book a number of details concerning Fire Brigades and their work which will, I hope, furnish assistance to many newly appointed officers, until they have learned from experience—the best teacher—what to do and what to avoid in connection with the work they have imposed upon themselves.

At the same time it has been thought well to add some information which, though of value to all volunteer firemen independently of the time they have been in the service, is not at present very accessible It is hoped, therefore, that this book will be found useful to many in addition to those included in my original plan In compiling it I have not thought it necessary to do over again what has been done previously There were before me some of the papers of Superintendent Tozer of Manchester and Birmingham, and a considerable quantity of material collected by the Editor of *The Fireman* and published by him in his "Dictionary of Fires," &c Of this, free use has been made without much alteration. I have also taken something from the contributions to the periodical Press of several Fire Brigade Superintendents, whose names are mentioned in connection with those parts for which I am indebted to them It may also be stated that in chapters eighteen and nineteen I have had to deal with subjects partially treated of in my "Fire Protection of Mansions," and I have not entirely re-written what was there inserted upon these subjects, especially as, dealing with practical matters upon which the opinion of practical firemen only have weight, these portions had received the benefit of the revision of the Superintendent of the Manchester Fire Brigade; and it was accordingly resolved to present them substantially in their original form

In regard to the arrangement of the contents, it may be remarked that Chapters one to six deal principally with the organisation of Brigades, their internal regulation, and their relations with the public. Chapters seven to sixteen relate entirely to the stations and the appliances and other details of the means with which firemen's work has to be performed. Chapter seventeen deals wholly with drill, and chapters eighteen and nineteen with practical work at fires and in the station. Chapters twenty and twenty-one refer to first aid to the injured at fires, and to Fire Brigade recreation respectively

It has only to be added that, owing to the arrangement which was advisedly adopted, it has been occasionally desirable to mention in one chapter facts which have been referred to previously. For instance, what has been said in describing the various appliances, has necessarily, in part, to be mentioned again in those chapters which deal with their use in actual work. It has been thought better to recognise the necessity and to repeat without compunction, instead of constantly to refer the reader from one page to another, a course which could not but be attended with considerable inconvenience.

PREFACE TO SECOND EDITION.

SINCE the first edition of this book was published in the year 1888, so many changes have taken place, both in the organisation of Fire Brigades and in the appliances which they use, that I have found it necessary to entirely re-write some chapters, while in others very extensive alterations have been made It is a matter for congratulation to all concerned with fire protection, that this important public duty is no longer neglected to the same extent that it was twenty-three years ago, and it is with much satisfaction that I am able to record the fact. As a consequence of the increase in the number of Fire Brigades in this country, and of the greater importance that is now attached to the question of fire protection, many improvements have been made in the appliances provided for the use of firemen.

The most valuable is the application of motor power to the fire pump, escape, tender and chemical engine, and I have devoted a chapter exclusively to this class of fire appliance. The chapters dealing with steam fire engines and manuals have been combined, and with additions form the chapter on horsed fire apparatus.

I take the opportunity to acknowledge the assistance I have received in bringing out this edition, especially from Mr. L C. Miller, B.Sc. (Eng.), upon whom the work of collecting information concerning the changes of the last twenty years has chiefly fallen.

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INTRODUCTION.

TRAINED FIREMEN TWO THOUSAND YEARS AGO—SUBSEQUENT TOTAL DISAPPEARANCE OF FIRE ORGANISATIONS—NO ENGLISH FIREMEN TILL EIGHTY YEARS AGO—ABSENCE OF FIRE BRIGADES DUE TO THE CHARACTER OF BUILDINGS—RUDE NATURE OF ENGLISH BUILDINGS UNTIL TUDOR TIMES—FIRE APPARATUS IN THE MIDDLE AGES—IMPROVEMENTS IN HOLLAND—NEWSHAM'S ENGINE—MUNICIPAL FIRE ARRANGEMENTS IN LONDON—SUBSEQUENT ALTERATIONS—FIRE PROTECTION UNDERTAKEN BY INSURANCE COMPANIES—THE FIRST VOLUNTEER BRIGADES—THE FIRST PROFESSIONAL BRIGADES—IMPROVEMENTS IN FIRE PLANT IN THE NINETIES—MOTOR FIRE ENGINES—PUMPS FOR MOTOR MACHINES—INSURANCE BRIGADES STILL EXISTING—ADVISABILITY OF INSURANCE COMPANIES UNDERTAKING FIRE BRIGADE WORK—EXTINGUISHING FIRES A PUBLIC DUTY—THE IMPORTANCE OF FIRE PROTECTION.

It is obvious that from the very earliest times it must have been necessary to make provision for the extinction of accidental fires, and that even in a state of semi-civilisation it would not be very unlikely that organised efforts would be made in this direction. Consequently, it is not surprising to find that organised bands of firemen were in existence nearly two thousand years ago. The old Roman "Matriculari" were, however, considered a necessary evil, and the formation of new bands was sometimes forbidden by the Emperors on the ground that the "firemen" were active, not only in extinguishing conflagrations, but in provoking breaches of the peace. During the centuries which succeeded the downfall of the Roman Empire these companies disappeared, and it would be difficult to find accounts of anything of the sort in any part of Europe during the 11th, 12th, and 13th centuries, nor was any organisation at all adequate to the necessities of the case in existence subsequently till very recent days

In this country, notwithstanding the many towns which were from time to time wholly or partially destroyed, there were no persons whose special business it was to extinguish fires till eighty years ago From the time when structures superior to a mud cabin were first erected, the villages and towns were occasionally wiped temporarily out of existence by the constantly active and powerful instrumentality of fire The absence of means for its control was not, therefore, due to the small number or extent of fires, but was undoubtedly owing to the character of the buildings Our progenitors, the Jutes, Angles, and Saxons, were more remarkable for the arts of war than for those of peace, and their domestic buildings especially were of a particularly wretched description The houses of the common people, as far as can be gathered, were rude wooden cabins, consisting of a single apartment, with holes in the sides to let in the light and a hole in the thatched roof to let out the smoke There was a door, too, of course, which the monks sometimes distrained upon when the "repselver" or reaping silver was not paid, as Jocelin of Brakelond mentions in his Chronicle The dwellings even of the humblest class had not always been quite so rude The Romans had taught the Celtic population the knowledge of brickmaking, but it departed with them when urgent domestic affairs called the Romans home In some districts the houses were more or less of stone, but few parts of the country afforded stone fit for building So that even the halls of the chieftains were the rudest wooden structures, and the churches, upon which most labour and money were expended, were often, but not always, of the same material.

Even as late as Plantagenet times, the houses of many of the descendants of the Saxon chiefs had improved very little Probably most of them corresponded pretty accurately with the description in "Ivanhoe" of the house of Cedric (time of Richard I) —"A hall, the height of which was greatly disproportioned to its extreme length and width The roof, composed of beams and rafters, had nothing to divide the apartment from the sky excepting the planking and thatch," which was in a bad state of repair in places and necessitated the use of canopies over the principal tables to protect the family and guests from the weather "There was a huge fireplace at each end of the hall, but as the chimneys were constructed in a very clumsy manner" (according to Hallam there could have been no chimneys, which were unknown here till the middle of the fourteenth century) "at least as much smoke found its way into the apartment as escaped by the proper vent The constant vapour which this occasioned had polished the rafters and beams of the low-browed hall by encrusting them with a black varnish of soot" No better preparation for a thoroughly comprehensive fire could possibly have been made At this time the luxury of glazed windows was almost unknown The knowledge of glass had been lost when the Romans left, and neither St Gregory's missionaries nor any of the bishops who made journeys to and from Rome seem to have re-introduced it Glass re-appeared at the same period that chimneys came into fashion, that is to say, about the time of Edward III Even then for some centuries glass was a luxury, only found in the castles and halls of the nobility and in ecclesiastical buildings. Glazed windows were considered as movable furniture, and were highy valued So late as Tudor times, the Earls of Northumberland, leaving Alnwick Castle, took the windows from their frames and carefully laid them by The effect of the absence of glazed windows in assisting a healthy young conflagration need not be mentioned, as a rule, the openings for light and air were covered only with lattice work.

It is not, therefore, to be wondered at that the clusters of wooden cabins which nestled in the valleys of Saxon England, with the great wooden hall, and the wooden church (sometimes covered with lead, as Glastonbury Abbey, re-built by St. Paulinus), frequently fell a prey to fire. Once "well alight" the whole was doomed, whether it was the fortified "burgh," the walled-in "ton," or the "ham," the small unprotected dwelling of a cluster of families. The simple ceorls were by no means fatalists, who stood idly by and saw their homes consumed without making an effort to save them. There are few notices of fires in Saxon writings in which the efforts put forth by the people to stop their progress are not mentioned. The chief reliance, if the monkish chroniclers of those times are to be believed, was placed, however, upon the miracles wrought by the pious bishops and clergy. Bede has many accounts of these miraculous interpositions of Providence, to which, if only out of respect to the memory of the greatest intellect and most truthful historian of Saxon times, with whose works no contemporary writings in civilised Europe will for a moment bear comparison, it would be a pleasure to attach at least a small amount of credence. Bede himself believed them thoroughly. He is much more trustworthy when he relates what actually took place under his own eye. His allusions to fires, though they are chiefly in connection with some miracle, are sufficient to show their frequency and severity. The Anglo-Saxon Chronicles record many large conflagrations. York appears to have been totally destroyed in 741, Canterbury in 754, London in 982. The Danish Army, which used the firebrand unsparingly wherever it went, burned Clifton and Wilton in 1001, Exeter in 1003, Norwich in 1004, Wallingford in 1006, Oxford in 1009, Thetford, Cambridge, Bedford, Temsford, and Northampton in 1010. Probably these towns were in less troubled times almost as easily restored as they had been destroyed; they were re-built upon the old plan, almost entirely of wood, and so remained with little improvement during the next five centuries, that is to say, till Tudor times.

And, as I observed, to this fact more than to any other, the absence of any systematic method of quelling fires is to be ascribed The Host, the reliquary and the blessed water stoup, were the fire apparatus of the Middle Ages. The practical means relied upon were the blowing up or pulling down of buildings in the line of fire, an easy business usually, but liable to be ineffective in windy weather There were no better for many years after priestly power as a substitute for a fire department had lost its credit in Great Britain The great fire of London in 1666, for instance, was stayed by the military, and the method adopted was simply to pull down buildings in advantageous situations, there was then no such person as a fireman, nor was there a fire engine larger than a hand squirt It would hardly be too much to say that, as far as this country is concerned, Fire Brigades are the production of the last century There were isolated instances during the latter years of the eighteenth of men whose work it was to extinguish fires under the direction of Insurance Companies, but they were not professional firemen. They followed other occupations, and were, as a rule, almost wholly untrained

On the Continent, however, greater progress had been made Jan Van der Heide, the engineer and artist, had a well-organised Fire Brigade in Holland as early as the year 1672 The Low Countries about this time were at the height of their prosperity, and were threatening the commercial supremacy of this country both in Europe and the East. Van der Heide designed an excellent manual fire engine which worked with flexible hose, for the introduction, if not the invention, of which we are indebted to this distinguished fireman. Together with his brother, he published in 1690 a description of his new engine and hose. the book was copiously illustrated with engravings from pictures in Van der Heide's well-known exact and careful style This work is not only a lasting tribute to the talent of the author as an artist and engineer, but it also shews his acquaintance with the principles of scientific fire fighting

It was not till a quarter of a century had elapsed that Van der Heide's inventions found their way into this country, and much longer still before they were generally adopted Newsham, in 1721, took out a patent for a manual engine, which was in many respects an improvement upon the Dutchman's, and, as a matter of fact, in regard to pumping capacity has never been excelled Even the manual fire engines now in use are in this respect not so powerful in proportion to their size, something having to be sacrificed to obtain convenient carrying arrangements No further considerable advance was made till the introduction of steam fire engines, which have not been in use more than fifty years, and at the time of the introduction of motor fire engines some ten years ago had not entirely superseded the manuals

Though the neglect to organise anything resembling a fire department was pretty general, there were a few local exceptions London and some other cities at various times, from 1189 down to recent years, have made it obligatory upon officials and even upon private citizens to provide buckets and other simple appliances for fire extinction, but no general Act applying to the whole country has ever rendered it a duty incumbent upon constituted authorities An Act passed in the reign of Queen Anne (1708) went so far as to compel each parish within the Bills of Mortality to maintain two fire engines and ladders out of the rates; but it made no arrangements for using them at fires, beyond offering rewards to those persons who brought up the first, second, and third engines in good condition and with proper working appliances. In the following year these rewards were extended to the keepers of other than parochial engines, so that the voluntary system of working engines at fires was sanctioned by Parliament over two hundred years ago The provisions of the Act of 1708 were practically repealed in 1833 (3 and 4 William IV, cap 90, sec 44), which enabled inspectors appointed for lighting and watching to maintain fire engines, and ordered each parish to keep an engine and a handpump, a leather hose, and a number of ladders But any better provision for working the engines was still wanting

Under these regulations the work of protecting life and property was so inefficiently performed that almost as soon as Insurance Companies began to do any large amount of business they found it necessary to procure and work fire engines of their own For many years the companies practically protected almost all the large towns, but this arrangement was not in any way satisfactory, the duty was too important to be left in irresponsible hands, and the companies of course arranged their work only in accordance with their own risks, so that often property which most required protecting was altogether uncared for Nevertheless they did some good work, and their men often rendered important service at fires in which no Insurance Company was interested The insurance engines were not supposed to supersede the parochial, but to work in co-operation with them, the former usually under the direction of a local superintendent or agent, who inaugurated a brigade of volunteers or paid men, and the latter under the parish beadle The insurance engine, however, was the real protector of the town in most cases, the other being little more than a sham, frequently it was not in order, or the functionary who was responsible for it had little knowledge of how to bring it into action, and considered it a nuisance In London this was the case in a very eminent degree. Whilst the insurance engines even before the formation of the London Fire Brigade Establishment were remarkably well kept and worked, the parochial engines often stood rotting in a churchyard, without hose or any tools, quite unworkable, and were taken to fires only for the sake of the reward.

The first important advance took place early in last century when Volunteer Brigades, as they are now called, first came into existence One of the earliest of which any detailed accounts have been preserved is the Ashford (Kent) Fire Engine Association A minute relating to a meeting of the Association in July, 1814, recites "that the Committee learn with pleasure that the institution is making rapid progress, not only throughout the county, but throughout the kingdom" It is evident from this that the notion of unpaid firemen, independent of the control either of insurance companies or of the parish authorities, was a new one at that time This Association was remodelled in 1826, and in the same year an organisation was formed in Sevenoaks, under the title of the "Sevenoaks Fire Engine Association" The Ashford men were officered by four inspectors of buildings on fire, three engineers, four branchmen, four foremen, and twenty-two gentlemen who were named as superintendents for procuring water The inspectors were the principal officers. This Association was liberally supported by the public and the insurance offices, it levied a charge upon sufferers for the attendance of its members at fires, but no payment was at any time made to the members personally. I have examined the minutes of proceedings and all the financial accounts of the Association from 1826 to 1860, and they do not record any payment for work or drill, neither is there a single item for refreshments during the whole of that time The Ashford Association must, therefore, be pronounced a genuine volunteer fire brigade of the highest class. Its honourable career has extended to this date; it is still in existence, though under a modified constitution, and is doing excellent work.

The title of the Ashford Fire Engine Association to be considered the pioneer of Volunteer Fire Brigades might perhaps be disputed, its own minute book, in fact, proves that other brigades were already in existence. But there is no doubt as to which was the first brigade that has any claim to be considered as having been composed of professional firemen. This was the Edinburgh Fire Department, established under the superintendence of James Braidwood in 1824. The men, during the time of their first superintendent, were only employed occasionally; they were workmen, usually slaters, house carpenters, masons, smiths or plumbers, fifty in number, divided into four companies, each of which consisted of one captain, one sergeant, four pioneers, and six or eight firemen. They were dressed in blue jackets, canvas trousers, and leather helmets and belts. The brigade was drilled monthly at four o'clock in the morning so as not to interfere with the daily occupation of the members, and to accustom them to drill in the dark. In its early days the only means of calling the brigade together was by verbal messages; upon a fire being discovered one watchman ran till he met another, and the alarm was passed on to the engine station in this way. Then the head officer on duty had to send to the head engineman of the district, the master of engines, the water officers, the inspectors of the different gas light companies, and to the main office of the department, from which the call went to the superintendent of the police, the lieutenants, the head enginemen of other districts, the superintendent of the water company, the Lord Provost, the Sheriff of the County, the nearest Baillie, the dean of guild, the members of the fire engine committee, the moderator of the high constables, and the managers of the different gas light companies. This tremendous array of infallible authorities all had duties to perform at fires. The chief magistrate present was at the head of affairs for the time being, and the superintendent had to keep him constantly informed as to what was going forward and to attend to his instructions. The magistrate, sheriff, the moderator of the high constables, the fire engine committee, and the head gas and water companies' officials assembled in a house near the scene; there they held a council of war and directed the operations This, at least theoretically, was the way in which Edinburgh fires were managed in Braidwood's time, but it is probable the local dignitaries practically interfered very little with the discretion of their fire master There is no doubt, at all events, that the brigade was thoroughly efficient and did its work well, its fame soon spread throughout the country, and it became a model upon which other brigades were established When Braidwood left Edinburgh in 1833 there was nothing of the kind in the country that could be compared to the Edinburgh Fire Department for efficiency

Still, it was a force consisting of men employed occasionally only The first permanent brigade was the London Fire Engine Establishment, founded in 1833, under Braidwood's superintendence, and maintained by the fire offices till the year 1865, when it was taken over by the Metropolitan Board of Works and re-organised upon a municipal basis Four years earlier than 1865 a professional brigade had been established by the Corporation of Manchester The Manchester Brigade was first organised upon a tolerably effective basis in 1828 The superintendent of that day was an excellent fireman, and his force soon gained a creditable reputation He resigned after 19 years' service, and was succeeded by his son, under whose superintendence its position was well maintained, and who resigned in 1861 The opportunity was then taken by the Corporation to re-organise the occasionally employed force, consisting of 50 men, upon a permanent footing Engineer Tozer, of the London Fire Engine Establishment, was appointed superintendent, and occupied that position till 1892

The Birmingham Fire Brigade as at present constituted was formed in 1879 Previously to this the department in this town had not been in an efficient state, and the occurrence of a large fire at Digbeth in August, 1878, by which four lives were lost, impelled the Corporation to take the matter seriously in hand A permanent force was established, and Mr. A. R Tozer, Superintendent of the Bristol Police Fire Brigade, was appointed superintendent, and held this position till his death in 1906. He was succeeded by his son, who still holds the office

Succeeding years saw most of the large towns in the country quickly follow the example set by these pioneers Where Brigades of professional firemen were formed the Police Force was largely and almost exclusively drawn upon In many other places the service of the firemen was voluntary and the cost of the plant was defrayed by the Local Authorities In other districts where the zeal of the populace for fire protection exceeded that of the Local Council, money was raised by public subscription for the purpose of buying fire extinguishing plant in order to form a Volunteer Brigade

By the year 1890 it may be said that fire extinguishing was generally recognised as a public duty Existing Brigades acquired more up-to-date plant, and new Brigades were founded in the smaller towns as well as in the large manufacturing centres The great extension in this direction naturally had a considerable effect on the appliances used, and many improvements were made Steam fire engines were greatly improved in the matter of ease of handling, and the well-known forms, commonly called "the twist bar," "the straight pusher," "the equilibrium," and the "horizontal Greenwich" engines all gave way to the vertical, short stroke, high speed engines, *which have now been the standard for ten years or more* Steam engines replaced manuals in all the larger brigades, and oil fuel was introduced. With the advent of electric trams with their overhead trolley wires all the old form of escapes which were wheeled along the road in a vertical position became impracticable for use in towns. This difficulty was really a blessing in disguise, for the old fire escapes were notoriously awkward things to handle; the manipulation of the new horizontal escapes was an easy matter for two men, and horsed escapes, which were to be seen in very few places twenty years ago, became common. As a first aid machine the chemical engine was introduced, and attained a certain degree of popularity. The utility of floating fire engines for the protection of waterside premises became more generally recognised and more floats appeared on the Thames, at Manchester and at Gloucester, and also were acquired by some private brigades Turntable escapes, or "water towers," were introduced to enable firemen to attack a fire from above, or at least upon a level

The next great step in the history of fire-fighting was the construction of the first Steam Motor Fire Engine in 1899 In this case a Colonial brigade played the part of pioneer—the Port Louis (Mauritius) Brigade being the first to acquire a machine of this type, made by my firm in the year named Speeds along the road, unattainable with horse-drawn fire engines, were now made possible Steam motors had scarcely become well known, however, when the petrol motor, which had been for years struggling against what seemed an inherent defect—untrustworthiness—was improved to such an extent as to make it reasonably suitable for fire brigade work The possibility of being able to start right away, full speed, from the fire station on receiving the alarm, without waiting to harness horses, appealed to every true fireman who had realised the immense value of gaining a few minutes at the start of a fire Hence, once the comparative trustworthiness of petrol-driven machines was established their success was assured In the last ten years over one hundred and fifty motor machines have been turned out by my own firm alone; Portsmouth and other brigades now consist exclusively of motors It is a source of much pride to me that my firm was the pioneer both of steam and of petrol motor fire apparatus

The history of fire protection in this country would not be complete without mention of the Hatfield pump, which has done so much good work in connection with petrol motors. The difficulty of driving a long stroke reciprocating pump, or indeed any of the common forms of reciprocating pump, on a motor chassis will be at once apparent to every engineer. The three-throw Hatfield pump, with its radial barrels and remarkably small air space, has embodied all the advantages of a short stroke compact pump, has a record of work on deep suction lifts that is unequalled, and it is easily fitted to a motor chassis.

The latest introduction into the fire service is the turbine pump. It is a form of the old centrifugal pump, rather inferior in efficiency to the reciprocating pumps in common use, and owes its limited popularity to the convenience with which it can be driven by a petrol motor. The inherent defect which the turbine pump possesses of being unable to work on a suction lift without a special priming device must, however, always weigh heavily against it as regards its utility for use at fires.

These brief details cover the history of extinction of fires in England. Horse-drawn petrol motor fire engines and electric motor machines can hardly yet be included in the history of fire brigade work, but I have mentioned them in Chapters 8 and 9, as the next few years may see considerable developments in these directions.

Returning to the subject of fire protection generally I may remark that the protection afforded by Insurance Fire Brigades originating almost concurrently with fire insurance itself has been continued in some places even to the present day. Thus there are still Insurance Brigades well organised and equipped in such important cities as Canterbury (Kent Fire Office), Worcester (Norwich Union), and Shrewsbury. London, as I said, was given up by the Companies in 1865. Birmingham till 1874 was protected by the brigades of the Royal, District, Norwich Union, Birmingham Alliance, and Birmingham Companies. Of late years the offices have been curtailing their expenditure in this direction; many have decided not only to disband their own brigades, but to refuse either to contribute towards the expenses of unpaid brigades, or even to pay for work done in extinguishing fires upon insured property The long period during which Insurance Offices have interested themselves in reducing losses seems, therefore, to have come to an end, and the Companies apparently intend to revert to their original object of distributing loss without concerning themselves except in the case of individual risks with its reduction Whether this policy can be completely carried out must be left to the decision of the future

Whatever may be said in regard to the advisability of the offices interfering in this work, considering it as a practical question, there is no doubt that, theoretically, the work of fire protection belongs to the local authorities representing the general body of the citizens.

The extinguishing of fires is a public duty, because it is necessary for the protection of the whole of the property owners in the town It is impossible to say from hour to hour where a fire may break out or how it may extend when it is once started, therefore no property that can be damaged by fire is altogether safe, and its protection is as much a general necessity as the lighting of streets or the protection of life and property from injury by violence It is for the common good that fires should be extinguished, because fires lessen the amount of rateable property in the town, cause an increase of fire premiums, throw persons out of employment, thereby diminishing their purchasing power, and sometimes leaving them to rely upon the poor rates; and to a greater or less extent fires prejudice the interests of all classes. The right of a citizen to protection from fire is not affected by his contract of indemnity with a fire office, neither does it arise from the absence of insurance. His insurance premium is paid for an indemnity from loss and not for protection, therefore a citizen retains intact his right to protection as a rate-payer, and secures indemnity by paying specially for it The community at large, to the common funds of which he contributes, has no right to inquire whether in the case of a fire occurring he will be indemnified for his loss, and if so, to throw the burden of protecting his property upon persons who have undertaken the risk The latter merely assess the risk as they find it, calculate their charges for doing so by means of certain well-understood laws of average, and there, as far as they are concerned, the matter ends The duty of the community is exactly what it was before the insurer had undertaken the risk

Practically, however, from a pecuniary point of view, the matter is not important, fire protection must be paid for, and the owners of property must pay for it themselves in some way or other If they pay for it out of the rates they will not have to pay for it through their insurance premiums, but it is quite certain that they and no others will ultimately have to bear the charges For even if Fire Insurance Companies maintain brigades for the extinction of fire, their expenses are increased by just so much as they spend on this object, and they will reimburse themselves out of premiums, probably adding a little profit as well On the other hand, if the town is left unprotected, losses will be so great that a very considerable increase in premiums is certain to take place The fairest way seems to be to leave the Insurance Companies entirely unburdened Although as far as the property owner is concerned it is usually merely a question of whether he pays for fire protection out of his right hand or left hand breeches pocket, yet it is to some extent inequitable to compel the Companies to bear the burden of fire protection, because in that case the owners of insured property are really paying to protect their less prudent neighbours as well as themselves.

Take, for instance, a fire at which an Insurance Company's engine is working at a station of a railway company which does its own insurance. Here the payers of premiums are contributing to extinguish fire upon property belonging to a wealthy corporation in every way able to rely upon its own resources If the engine belongs to the inhabitants the case is different; the railway company has a clear right to its assistance, for they are probably the largest ratepayers in the place But, in view of the fact that a small part only of property liable to destruction by fire is uninsured, it is difficult to see that any great amount of hardship is entailed

Even when the safety of human life is not taken into consideration, the importance of thoroughly protecting every town in Great Britain is manifest and undeniable. It was estimated by the *Times* in 1882 that the national loss by fire in the United Kingdom averaged £9,100,000 yearly, and that a sum of £6,900,000 is annually paid to insurance companies, together, £16,000,000 per annum, a sum, as far as I can ascertain, somewhat below the mark Now it is obviously not possible that the whole of this sum can be saved, but as the £9,100,000 is wholly wasted to the nation, and the remainder is practically unproductive, and is merely useful as it pays for the mitigation of individual misery which the loss of the larger sum would cause, it becomes a matter of considerable importance to reduce the sum to much smaller dimensions This can only be done by an intelligently conducted defence against fire in every quarter where it is likely to make its appearance The efforts which may be made in this direction may be classed under three heads First, if those who cause fires through carelessness were made legally responsible for the results as they are in some continental countries there is no doubt an immediate reduction in the number of fires that break out would occur Then, if the fire protective organisations throughout the country were thoroughly effective, a further reduction in the fire loss would take place, because those fires which do break out, notwithstanding increased precaution, would be better extinguished. And thirdly, a stringent Building Act for the whole country would prevent the erection of many structures conducive to the rapid spread of fire when it is once started. The chief considerations under the first head I have already fully discussed in my "Fire Protection of Mansions," and it does not fall within the scope of my present purpose, which has more particularly to do with the promotion of those which may be classified under the second. The subject of the general improvement of buildings from a fireman's point of view demands separate treatment, which though at one time I intended to undertake it, I must now leave to other hands.

THE FIRE BRIGADE HANDBOOK.

THE FIRE BRIGADE HANDBOOK.

CHAPTER I.

ESTABLISHMENT OF NEW FIRE BRIGADES.

THE MAN FOR THE WORK—FIRST STEPS REGULATED BY THE MEANS OF SUPPORT—THE LOCAL AUTHORITY AND THE PUBLIC MUST BE IMPRESSED WITH THE DESIRABLENESS OF PROTECTING THE TOWN—ADVISABILITY OF CALLING PUBLIC MEETING—ENLISTING INFLUENTIAL PEOPLE—ASSISTANCE FROM INSURANCE COMPANIES—HOW OPPOSITION IS LIKELY TO ARISE—ARGUMENTS TO BE USED AT PUBLIC MEETINGS—LOCAL AUTHORITIES SHOULD PAY FOR APPLIANCES.

When it has been made evident that the fire defences of a town are insufficient, and that steps must be taken to improve them, the man for the work is not usually slow in making his appearance. He will find the task of organising a Volunteer Brigade an arduous, but, on the whole, a very pleasant one. Accomplished successfully, it will be a source of lasting satisfaction to him, for it will confer a permanent benefit upon the town, and will entitle his name to a place in the records of civic history. In establishing a Volunteer Brigade, the first steps to be taken will necessarily be guided chiefly by considerations relating to its means of support. The great object must be to secure public sympathy, without which the requisite funds at the beginning cannot be obtained. If it is proposed that the brigade shall be supported mainly by a Town Council, or other Local Authority, it will, of course, be necessary to impress that Authority with the desirableness of adequately protecting the town. On the other hand, if the general body of the inhabitants is to be asked to provide funds for the purpose, little or nothing can be done unless the general public is thoroughly impressed with the same fact A large fire will have great effect for a short time, but long before any details can be arranged this will have died away, only to be renewed for a short period by the next large blaze Whatever is to be done in regard to securing funds, it is usually advantageous to call a public meeting to ventilate the subject thoroughly If possible, the Mayor, Chairman of the Local Council, or Rector of the Parish, should be asked to preside Before calling the meeting it is as well to see the influential men of the place privately, and to ask for their sympathy and assistance, which will, as a rule, be cheerfully given Possibly it may be thought that, in the discharge of an unremunerated service for the good of the locality it ought not to be necessary to go from one to another, humouring fads, and generally drawing largely upon one's resources of tact But necessary it undoubtedly is, for otherwise opposition may be encountered, springing not from any objection to the brigade, but from ill-humour at the omission to consult the " injured " persons in the first instance

As a rule, a Local Authority does not care to support any new object out of the rates without some manifestation of public feeling, neither do the inhabitants care to subscribe unless the matter has been previously discussed in public and a little enthusiasm has been got up

Insurance Companies will sometimes, though rarely, assist They will probably say they are under no obligation, either legal or moral, to do so. Perhaps it is better to apply to them through local agents, if they will consent to support the application, rather than direct

When the question is brought before a Town Council it is usually found that one or more members argue in opposition that the work of fire extinguishing ought to be undertaken by the Insurance Offices. This, however, is illogical, and it will be found if the Insurance Offices are asked to contribute as a matter of right, they will invariably decline to do so. For many years they have preferred to take risks as they find them, and if a town is unprotected they simply charge higher rates of premium. The Insurance Company has practically not so much interest in the extinction of fires as would at first sight appear, for if all fires were extinguished quickly there would be little or no insurance, and the perfection of fire-extinguishing arrangements in any town means that there will be less insurance and lower premiums there than in badly-protected places

I have sometimes been told by Insurance men that it does not pay to have towns too badly off, neither is it so much to the advantage of the companies if they are too well off for the means of fire extinguishing

In addressing the public meeting referred to it will be advisable to shew the economy of adequate fire protection; for this purpose it may be as well to demonstrate what is not always obvious to careless thinkers, viz , that fires as a whole must be sources of loss to the community, notwithstanding the fact that the property destroyed may have been fully insured. Of course sometimes fires will benefit individuals, but if we enquire what effect fires have upon the national wealth, it is clear that the result is bad. The destruction of material wealth cannot possibly contribute to the general aggrandisement. There has been absolute loss, and this loss must fall somewhere. It may be upon a single person if there has been no insurance, or it may be distributed over the whole civilised community, if it happens to be covered by a large and wealthy company with extensive ramifications. In either instance the loss is the same, in one case it is felt severely by an individual, in the other it is felt lightly by a large number. But the nation is the poorer to the extent of whatever has been consumed.

The effect of fires upon smaller communities is not so apparent, and there is still much error prevalent concerning it It is often supposed that they promote prosperity in the towns where they happen, are good for trade, and bring work and money into the locality Granting that this may be sometimes true, it is certain that the ultimate result is a loss Before the outbreak of fire the wealth of the townspeople is a certain quantity; when the fire is extinguished, this quantity is reduced by exactly the extent of the damage occasioned But it may be urged, the damage is made good when there has been adequate insurance, from the outside. This is not so The money which is paid over to the sufferer by fire is drawn from all parts of the town itself, and from other towns and districts. If fires in any particular place increase in number or magnitude to such an extent that the losses exceed the amount paid as a consideration to the societies which cover them, that amount is at once raised By a gradual process individual premiums are augmented, the most hazardous risks are left upon the owners' hands, and the Insurance Companies, by taking the best only at higher rates, set themselves right for the future, and, as well, very probably reimburse themselves for past losses. So that it may be said with truth that each town, sooner or later, bears its own loss by fire, and if it has exceeded the average it very probably for some years bears a little more than its own.

The majority of heavy losses occur by the destruction of extensive manufacturing premises, and when this takes place there is not only the initial damage to be made good, but a variety of incidental losses occur in addition. For a time the local taxes suffer in regard to the amount contributed. The workpeople out of employment, or at least some of them, are thrown upon the rates, the purchasing power of all is reduced, and their rents are more or less unpaid. Thus trade suffers to a degree regulated by the proportionate extent of the calamity; if it is small, and occurs in a large town, the difference is hardly noticeable; if it is large, and in a small town, there is much evident distress. But large or small, the locality is just so much worse off in the very great majority of instances. There are exceptions, of course, as there are to every rule, the chief occurring when a fire causes no long suspension of business, which is carried on temporarily upon other premises, whilst rebuilding operations bring a number of workmen into the town, and occasion, for a time, some extra activity. But such cases are very rare In view of these facts, the wisdom and economy of maintaining adequate fire departments can easily be made manifest A thousand pounds for plant, and two hundred pounds per annum, equal, at four per cent, to a total expenditure of two hundred and forty pounds yearly, if invested and expended upon maintaining fire appliances, will, in a moderately large town, save property to the value of many times the outlay. For a steam fire engine, costing, say, five hundred pounds, may possibly, in the course of its first year, preserve property to the value of fifty thousand pounds, and the sum is practically saved to the property owners of the place, that is, to precisely those persons who have purchased the steamer, and the gain to them is in the same proportion to their expenditure as the value saved by the engine is to the engine itself. Thus, manufacturing premises of the value, with contents, of £40,000, may be assessed at £800 per annum If the owner has to pay his share of a penny rate extra for the engine, he contributes £3 6s. 8d. Now, if in consequence of the additional protection afforded, he saves 2s. 6d. per cent. per annum on his insurance, he realises £50 yearly in return for his outlay. This may be an extreme case, but I have yet to learn of the town or individual expending money judiciously upon fire apparatus that has not found it the most profitable investment which could be made. These facts, and the arguments concerning the public duty of extinguishing fires, which I have brought forward in the Introduction, may be profitably urged, and should set the *raison d'être* of the new brigade in a clear light.

It will usually be found there is no great difficulty experienced in obtaining ample funds if the matter is properly placed before the inhabitants. It has sometimes happened that even in a town of moderate size £300 or £400 have been raised by public subscription in two or three weeks. However, it is as well to say that this means of supporting a Fire Brigade is not, perhaps, the best Fire protection, as I have tried to shew, is, in reality, a matter of police, and should be taken up by the local authorities, who have ample powers, as will be seen in a following chapter, to maintain a brigade Now, if these authorities have not chosen to avail themselves of the powers they possess, and it has, consequently, been necessary for private individuals to step in and perform the work without remuneration, there is no reason why the authorities should not, at least, provide the necessary appliances If they do so they relieve the firemen from the work of collecting subscriptions year by year, and so enable them to devote more time to acquiring proficiency in their work

Many Corporations and Local Authorities avail themselves of the Local Government Board Act, which enables them to borrow money to purchase steam or manual fire engines and other appurtenances. The borrowed money can now, of course, be obtained at a very low rate of interest, it is made redeemable within a certain period, usually about 20 years from the date of the advance The plan is obviously a fair one to the ratepayers, the life of a steam fire engine being much over 20 years, it is right that the cost should be spread over a period, and not fall upon the rates in any one year. A loan for capital expenditure for the purpose of increasing the efficiency of the Fire Brigade is never refused by the Local Government Board, except under very special circumstances.

In many towns a compromise between the two systems is arranged. The Local Authorities provide the engine, hose, &c., and the firemen solicit subscriptions to cover the cost of uniform and the unavoidable little expenses attached to drills, &c. In this way arises the anomaly of Volunteer Officers receiving such "salaries" as one shilling or eighteenpence a year, as the cost of fire extinguishing plant cannot lawfully be borne by the rates unless it is to be actually in the possession and under the control of the Local Council. Such a "salary" is frequently spoken of as a retaining fee. There are, in fact, many variations in the ways in which brigades are supported; it may be convenient if, in the next chapter, I enumerate the principal varieties of fire organisations which are to be found at the present time in this country.

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CHAPTER II

FIRE BRIGADE ORGANISATION

VARIETIES OF FIRE BRIGADES—PROFESSIONAL BRIGADES—POLICE BRIGADES — VOLUNTEER BRIGADES — PRIVATE BRIGADES—SELECTION OF CANDIDATES—NATIONAL FIRE BRIGADES UNION — PHYSICAL TESTS — NAMING THE OFFICERS—OFFICERS' QUALIFICATIONS

British Fire Brigades may be classed, with few exceptions, under one or other of the following heads —

1 Professional brigades composed entirely of trained firemen, permanently employed, paid out of the rates, and following no other occupation, brigades so organised are to be found in London, Manchester, Birmingham, and other large towns

2. Police Fire Brigades, with a trained fireman as chief, in which some of the firemen are permanently employed and others do ordinary police duty and receive an additional allowance for work at fires.

3. Police Fire Brigades similar to the last, with the head constable as chief officer

4 "Volunteer" brigades, receiving payment for work at fires only, and obtaining the apparatus from the Corporation or Local Council

5 "Volunteer" brigades similar to the last, but obtaining their apparatus by means of voluntary contributions from the inhabitants

6. "Volunteer" brigades who receive no payment except retaining fees, but whose apparatus is provided out of the rates

7. "Volunteer" brigades who receive no payment, purchase their own apparatus, and defray all expenses out of their own pockets.

8. Brigades whose apparatus is furnished by Fire Insurance Companies and belongs to them

9. Private Fire Brigades maintained by noblemen and gentlemen, railway and dock companies, mill owners and other manufacturers, large wholesale warehousemen, &c

It is foreign to my purpose to give many particulars of Professional and Police Fire Brigades which may be considered official institutions, and therefore to a great extent outside the scope of this book It may be mentioned, however, that Professional Brigades and most of the Police Brigades are of unchallenged efficiency The London Department is as well organised as any Brigade in the world, and is now of adequate size for the area which it has to protect In Manchester, Birmingham, Liverpool, Edinburgh, Glasgow, and in the larger cities generally, the Fire Departments are splendidly organised, and are sufficiently large for the work to be done in protecting the area within the municipal jurisdiction and the districts surrounding

Police Fire Brigades, with trained firemen, and the Head-constable as Chief Officer, exist in many large towns, and are as a rule satisfactory Where the risks are not of a large or dangerous character, and the size of the town would not justify a large expenditure upon a fire department, the Police Brigade is perhaps the best and most economical It has in fact been considered by many experts in matters affecting Local Government that a Fire Brigade of this kind is the best for any town; in 1877 a Select Committee of the House of Commons recommended the transfer of the London fire department from the administrative control of the Board of Works to the Commissioners of Police The Committee did not propose that the members of the fire department should in any way undertake police duties, the department was to be a separate branch, and was to be under the immediate control of a separate Assistant Commissioner It was considered by the committee that the Metropolitan system contrasted unfavourably with that followed in many provincial towns, where the Police, Fire Brigade, and Water department were all under the control of a single authority; some of the best exemplifications of the advantage of this consolidation are furnished by the large Lancashire and Midland towns. At the present time the Southampton Town Council are considering the advisability of converting their existing Brigade into a Police Brigade. This matter, however, only touches the administrative control of a Fire Brigade, the brigade itself, though under the control of a Commissioner of Police, or a Local Watch Committee, may be one of several different kinds Brigades consisting wholly of policemen have been established in many of our largest towns In *Liverpool* there is a fire department consisting entirely of members of the Police force, under the superintendence of the late Mr G Copland, who was appointed in 1874, and the care of the late Major Greig, the department developed into a well-organised institution, and its character has been maintained under the successors of the two capable officers above named

The *Cardiff Fire Department* is another example of an excellent Police Fire Brigade The Head Constable, Mr J. W McKenzie, is Chief Officer Under him are one superintendent, two engineers, 15 permanent firemen, two drivers and stablemen, and 16 auxiliary firemen The Brigade is governed by the Watch Committee and is controlled by the Head Constable The wages received are 25s per week on appointment, increasing by 1s per week annually up to 30s, on completion of seven years' service 31s, and after ten years the maximum 32s per week There are in addition two merit classes of 1s. 6d. each extra per week Firemen are provided with uniform and receive 10d per week in lieu of boots, and 3s. per week rent aid In the event of sickness from natural causes 1s per day is deducted from their pay and placed in a Superannuation Fund, but if the sickness is caused through an injury sustained in the execution of duty, full pay is allowed. If an officer or fireman is on the sick list for a longer period than two months his case must be especially reported upon Annual leave is as follows:—Superintendent 21 days, engineers 10 days, and firemen 7 days Engineers and firemen are also allowed one day's leave in seven By the Corporation Act, 1894, section 18, a superannuation allowance is provided for the officers and firemen, and 2½ per cent is deducted from their pay towards the support of the Superannuation Fund

Bristol has an excellent Police Brigade, the Chief Constable, Mr J Cann, is chief officer, and he is assisted by a superintendent *Hull* has a Police Brigade which has lately been considerably improved, under the control of the Head-constable *Rochdale* has a brigade consisting of twenty-six policemen, six of whom are permanently employed The Chief Constable, Mr Leonard Barry, is chief officer, and one inspector is provided with house, fuel and light, as superintendent, the engineer has five shillings, the assistant engineers four shillings, and the firemen three shillings per week extra for their fire brigade work A skilled engineer and motor mechanic is also attached to the brigade The *Hereford City Brigade* is another variety of police brigade It is under the control of the City Council, and consists of the Chief Constable as chief officer, three permanent firemen, police officers as engineers, a superior artisan as lieutenant at a salary of £7 a year, in addition to 12 occasional men, principally local mechanics, who are paid retaining fees varying from £2 5s to £5 per annum, according to their length of service in the brigade In addition to this they receive 7s 6d for attendance at each fire in the county, and 5s for a fire in the city, with additional pay in accordance with scale when they are engaged for more than eight hours at a time *Nottingham, Portsmouth, Leeds,* and many other large and small towns are protected by Police Fire Departments The Police Fire Brigade possesses important advantages in several respects; it furnishes a permanent force of men little inferior, if judiciously selected, to trained professional firemen, and under thorough discipline, at a small cost to the town. The fire protection is in responsible hands, and the local authorities have direct control over it Some considerable amount of attention may profitably be given to the selection of men from the force to form the Fire Brigade. All the qualities which go to make a good policeman do not tend to make an efficient fireman; the former is a big man, of commanding presence, thoughtful and slow to act; the latter is of the middle height, wiry, intrepid and quick in movement But probably in every large force a sufficient number of suitable men will be found, if not, they can easily be enrolled with this object in view

The *Stockton-on-Tees* Corporation Fire Brigade is a combination of paid and volunteer firemen The captain is appointed by the Corporation and he appoints his own officers The brigade includes the captain, deputy captain, the chief fireman, two engineers, turncock, seven firemen, seven auxiliary firemen, and two callboys The chief fireman is permanently employed, and receives 30s per week, with house, coal, light, and water and extra for fires The two engineers receive 17s 6d per month and the firemen 15s per month for taking night duty each ninth night The auxiliary firemen do not take night duty A monthly practice is held for which all members attending receive 2s 6d Four firemen who follow their own trades in the day-time reside on the premises Extra wages are paid for attendance at fires The brigade is, of course, supported out of the Corporation rates, and the apparatus is paid for from that source entirely

Another variety of brigade is that at *Southampton*, which is entirely under the control of the Town Council, who appoint the officers There are three divisions and the permanent staff of the brigade consists of one superintendent, one station officer, two coachmen, one engineer, two motor drivers, and five firemen. In addition to these there are three deputy superintendents, an assistant engineer, a secretary, and 35 firemen, making a total strength of fifty-two.

The *Croydon* brigade is controlled by a sub-committee of the General Purposes Committee of the Corporation. The staff consists of the chief officer, 2nd officer, two station foremen, twelve permanent firemen, and eighteen retained firemen available from 7 p.m. to 6 a.m. The scale of pay is as follows:—2nd officer, 40s. per week, rising to 50s. by biennial increments of 2s., station foremen 35s. per week, rising to 37s. 6d. in four years, engineers 31s. 6d. per week, rising to 32s. 6d. in two years, mechanics 30s., rising to 32s. 6d. in three years, firemen 25s. per week, rising to 29s. in five years and to 31s. in nine years, subject to their being able to drive mechanical appliances, probationers (for six months) 24s. per week. All grades receive free lodging, light, uniform, and boots, and the second officer and foremen coal in addition. All increments are subject to satisfactory conduct. The retaining fee for the auxiliary firemen is £5 per annum, they also receive 3s. per night station duty, 3s. for one house theatre duty, 4s. for two house or night theatre duty, 2s. 6d. for first hour at a fire, 1s. per hour after, and 5s. per day for relief station duty. The brigade is supported out of the rates. With a population of one hundred and sixty-four thousand odd, and a rateable value of £1,018,771, it is found that a 1d. rate covers the cost of upkeep. Chief Officer Dane writes that the cost last financial year was £3,186 17s. 8d., and £740 10s. 2d. was added to the sinking fund.

There are still a few Insurance Brigades in existence, although their number tends to decrease. As an example, that of the *Norwich Union Fire Insurance Company* at Worcester may be mentioned, it consists of a chief officer, Mr. A. B. Sayce, who has maintained a high state of efficiency in the brigade for thirty years; and officer his son, an engineer, and eleven firemen.

Volunteer Brigades, which have existed in one form or another for many years, still constitute the only fire protective organisation in a great majority of towns in this country, and are likely to do so for many years to come. I use the word Volunteer as it is commonly employed, that is, to indicate a brigade which is not composed either of permanent firemen who make the work their profession, or of policemen There is no other word which will include all classes of unprofessional firemen, from the merchant prince who spends a large sum of money upon the brigade he is connected with, to the artisan or labourer who is paid for attendance at fires and drills The term "Volunteer" is not very appropriate, but it has been so long in use in this way that there is no possibility of rejecting it

On the Continent the Volunteer system never obtained a very great hold, and the brigades there now are all under national or municipal control, and most of them are organised more or less upon a military basis In parts of Australia and New Zealand fire brigades are directly under the control of the Government America is the native land of the Vounteer Brigade, where it flourishes still, although many towns have disbanded their unpaid brigades and now spend large sums upon professional fire departments In a number of towns in the States the Volunteer departments at one time embraced from ten to forty per cent of the able-bodied male population, thus the town of Reading at the time when it had forty thousand inhabitants had an unpaid department of more than two thousand five hundred men This, of course, was many years ago The service in some instances gives exemption from other compulsory duties, and numbers doubtless join it for this reason This is also the case in some South American countries, where Fire Brigade service is rendered in place of service in the National Guard or of other military duty.

The state of public opinion in some districts in this country where fire protection, which is essentially a public duty, is either repudiated or neglected, and is provided for by private enterprise, is much to be deplored, but as it undoubtedly exists it must without further complaint be recognised. The form taken by a Volunteer Brigade in any town will chiefly be decided, as I have hinted in the previous chapter, by the amount of sympathy and assistance it obtains from the local authorities

One or two examples may be referred to The *Alton Fire Brigade* consists of sixteen members from whom are elected chief and 2nd officers, foreman, engineer, assistant engineer, hon secretary, and treasurer Officers retire annually but are eligible for re-election There is also a drill class of six members, candidates for which (between the ages of 20 and 35) may be proposed by any member at a General Meeting The business of the brigade is transacted by a committee composed of the chief and 2nd officers and five members of the brigade elected annually The plant is the property of the Alton Urban District Council

The *Coventry Volunteer Fire Brigade* is under the control of a Committee appointed by the City Council The Brigade consists of a chief officer, a paid and permanently employed station officer, and such officers and firemen as the Committee may appoint from time to time Each member on entering is supplied with uniform and accoutrements and, with the exception of the chief officer, is paid a retaining fee of £10 10s per annum for each year that he remains a member. The apparatus is paid for out of the rates.

The *Hastings and St Leonards Borough Fire Brigade* is at once one of the oldest and most vigorous of Provincial Brigades It was founded in 1861 by the late Chief

Constable, Mr W. M. Glenister, who, having been called upon to furnish a report on the existing state of affairs at that time, ventured to express his opinion "that the fire protection of the Borough was very defective and inefficient," whereupon the gentlemen forming what was then designated as the Fire Establishment resigned to a man At five o'clock the next morning Mr Glenister presided over a meeting at the top of the High Street, had a drill, and before six a Volunteer Fire Brigade had been enrolled The brigade flourished under this officer and his successors, and at present has a membership of ninety-one The brigade consists of a captain, 1st lieutenant, 2nd lieutenant and secretary, eighty-four firemen, treasurer, surgeon, drill instructor, and collector There are nine sections, with a foreman, an engineer, a sub-engineer and a number of "pioneers" (firemen) to each. The members are chosen from the mechanic class and are insured against accidents Rewards are given to encourage attendance at drills, and for keeping the appliances clean and in order The men also receive the gratuities paid for their attendance at fires, to repay them for loss of time when called away from their daily occupations for fire or watching duty Every man has to produce a medical certificate of fitness before being admitted into the brigade The Corporation provide the appliances and give an annual grant of £100, many of the principal Fire Insurance Companies have been subscribers to the funds from the beginning, and the balance of about £200 per annum which is required for the maintenance of the brigade is raised by public subscription

The *Loughborough Borough Fire Brigade* is a retained brigade consisting of the superintendent, Mr Jabez Cliff, two foremen, one being in residence at the fire station, two engineers and ten firemen Thirty-five neighbouring parishes pay an annual retaining fee, in return for which the brigade respond to a call with a steamer and six men.

The *Lydd Fire Brigade* was founded in 1890 by a vote of the Town Council who pay the cost of upkeep. No fireman receives payment for work inside the borough All calls received from outside the borough, whether from subscribers or not, are responded to

Recent years have seen the formation of a large number of private fire brigades in connection with manufacturing firms. Many of these are well organised and highly efficient, and possess plant of the most up-to-date kind, more than one private brigade including in its apparatus a fire float

The brigade of *Messrs Bass, Ratcliff and Gretton, Ltd*, is by no means a new brigade It was founded in 1859, and Chief Officer Edward Lees reports that the original manual engine has attended 250 out of the 379 fires at which the brigade has worked, and is as good as ever In addition to this machine the brigade has two steamers and a hose tender There are three breweries, and out of a total force of 60 drilled men 10 are on duty day and night at each Fires in the county and the town of Burton-on-Trent are attended The brigade is composed of one superintendent, one deputy superintendent, three engineers, two stokers, three coachmen, and ten firemen All live in houses fitted with call bells connected to the Central Station and close to the engine house

The *Clarnico Fire Brigade* (*Messrs Clarke, Nickolls and Coombs*) is the largest private fire brigade in the kingdom One of the directors of the firm, Captain G. M Horn, is chief officer, and under him are a second officer, a third officer, who also acts as secretary, an engineer and 142 firemen. During working hours the whole of the brigade is available for immediate duty, while at night four watchmen, three stokers and a corporal are on duty, and thirty of the men are available within three minutes, being housed in the firm's own cottages adjacent to the works. The brigade is divided into four sections, each in charge of a corporal. Before being appointed to the brigade each man has to undergo three months' drill, consisting of foot drill, hose and engine drills, and hose cart drill. Each man has to be himself carried down and also to carry a person down a fire escape, to manage life lines and a jumping sheet

Each section of the brigade is drilled once a week, and the whole brigade receives two calls monthly, one night and one day The drills are nearly all wet All drills are paid for and men turning out for night drills receive double pay Two horses are kept in readiness for an immediate turn-out night or day Although the primary duty of the brigade is to protect the extensive works of their employers they have on many occasions turned out to fires in the surrounding districts and have rendered good and effective service on several occasions Fires at the works are happily of rare occurrence, but on several occasions when outbreaks have been discovered the value of the brigade and their efficient training have been amply demonstrated

Attached to the brigade there is, it may be of interest to add, a very useful trained Ambulance Corps, consisting of 34 men and 23 trained nurses, whose services have on many occasions been requisitioned to render first aid, not only in burning accidents, but in other accidents inseparable from a large factory employing over 3,000 hands

In getting a Volunteer Brigade together the importance of choosing suitable candidates is obvious In most places a number of men will offer themselves for membership As unsuitable men when once enrolled are difficult to get rid of without unpleasantness, great care should be exercised in making the selection It is not unimportant that the private members of a brigade should, if possible, consist of men of one social rank. Neglect of this is certain to create more or less friction, although the matter will probably correct itself in time The candidates selected should be men of good physique, preferably of middle height, not afraid of working, nor indisposed to obey orders In many Volunteer Brigades the men are chosen from the mechanic class, the average mechanic has several qualities which go to make a good fireman It is not advisable to appoint a bad-tempered man, however suitable he may otherwise be

It should be constantly kept in mind that in a Volunteer Brigade there are few means of enforcing discipline The authority of the officers rests upon the good feeling of the brigade, and if there is dissatisfaction from any cause and want of co-operation in working, the brigade is certain to be more or less unsatisfactory It is, of course, impossible to secure perfection in any fireman The above considerations, however, need not be entirely lost sight of

In connection with Volunteer Brigades the National Fire Brigades Union has done much to improve the general efficiency This Union now embraces 692 brigades with an aggregate of nearly 15,000 members The chief objects of the Union are to provide a central organisation for Fire Brigades and Salvage Corps, to promote uniformity in drill, uniform, scale of charges for attendance, and other matters incidental to the service, to encourage the establishment of brigades in districts not at present protected, to give advice in the formation of such new brigades, and to render financial assistance by way of loan, to provide opportunities for intercourse amongst the Fire Service of a social, educational, and competitive nature, also to establish or superintend any charitable or benevolent fund from which donations or advances may be made to assist necessitous members of the Fire Service, and the widows and orphans of deceased members The healthy spirit of rivalry, engendered by the Union's competitions, has been of the utmost value in keeping up and improving the standard of efficiency and keenness in Provincial Fire Brigades

In regard to physical fitness for fire brigade work, the candidates may be tried in the way that candidates for admission into the London Brigade are tested Each man has to prove his strength by raising a fire escape single-handed, with the tackle reversed The rope or fall of the fire escape used is 120 feet in length; when a man on the carriage lever is pulling up the machine with the tackle reversed the initial pull is 140 lbs, and the fixed strain when he is not pulling is 60 lbs Preferably men should not be over 30 years old at the time of their appointment, should measure at least 37 inches round the chest, and be at least 5 feet 5 inches in height After they have been measured, had their strength tested, and been approved by the chief officer as stout, strong, healthy looking, intelligent men, and in all other respects apparently eligible, they are in London sent for medical examination before the surgeon, who, according to his judgment, either rejects or passes them In New York candidates are subjected to both a mental and physical examination The physical test is as follows Lift a 60 lb dumb-bell with right and left hand "Chin" the horizontal bar and "tip" on the parallel bars ten times for a perfect mark Use the hand grips Lift a 35 lb weight behind the neck and get up from a sitting position Jumps of 4ft 4ins Go up a ladder hand-over-hand and come down again Go on the chain pole, with a straight lift and a back lift, the chain being tied to the floor A knee compression test is also applied The minimum height of candidates must be 5ft 8ins, their weight a minimum of 140 lbs for the minimum height, and 5 lbs extra for every inch

Of course it is not always possible, when selecting the members of a volunteer brigade, to obtain all that is desirable in the way of physical fitness, and to insist upon the qualifications which may be demanded in the case of permanent firemen would lead, usually, in small towns, to no appointments at all being made Still there may be some value in placing on record the conditions demanded in large brigades as an ideal which may be aimed at, although it may be seldom attained

A question which usually involves some discussion in the case of a new brigade is the naming of its officers. Perhaps chief officer and 2nd officer are the most usual titles, and may be recommended for adoption Military designations are sometimes preferred in the case of Volunteer Brigades in order to distinguish them from paid institutions, in which captain and lieutenant are less frequently employed, on the other hand superintendent, foreman, and engineer are occasionally used as being quieter and less pretentious The matter is evidently one for settlement in accordance with the individual tastes of those who have to come to a decision

If they have had no previous experience the officers should lose no time in making themselves thoroughly qualified for their work There is no difficulty in mastering the theoretical part of the subject, and the presence of mind and cool judgment which are required more than anything else in order to make a good fireman can only be gained by actually working at fires It is possible, however, to acquire very quickly a knowledge of the work of getting the engine and other appliances into action, and as every officer no less than every fireman should acquire the art of handling the appliances with facility, upon a new brigade being formed, it is advisable to have very frequent drills If the chief officer can reside in a town for a time where there is a good professional brigade this will be found to promote accurate knowledge of Fire Brigade work

I ought to add a word or two concerning private brigades which have been formed amongst the servants of several railway and dock companies and upon many gentlemen's estates Some have attained a considerable degree of efficiency, chiefly through the periodical training they have received from competent drill instructors A private brigade seldom costs much, and may with advantage be established wherever fire appliances have been provided and the raw material for the brigade exists Fire engine drill is a pleasant and healthy exercise, and is almost invariably undertaken cheerfully without the expectation of making a profit out of it. The formation of a brigade out of the resident staff gives a value to the private apparatus much above what it would possess if there were no trained men at hand to use it in case of emergency In a following chapter will be found a set of rules and regulations formed for the guidance of a private brigade Of late years stationary fire plant has been largely employed for the protection of public buildings, of country mansions, manufacturing premises, and of out-of-the-way detached settlements such as, for instance, the cable stations on the Irish coast In all of these cases the institution of a brigade composed of employees is of the greatest use The most perfect fire plant is of little value if there is no one on the spot able to use it quickly and with the confidence which is only acquired by perfect familiarity and constant practice

CHAPTER III

STATUTORY POWERS AND OBLIGATIONS

LOCAL AUTHORITIES HAVE POWER TO MAINTAIN FIRE BRIGADES OUT OF THE RATES—THE LIGHTING AND WATCHING ACT—THE TOWNS POLICE CLAUSES ACT—POOR LAW AMENDMENT ACT—PUBLIC HEALTH ACT—LEGAL OBLIGATION UPON LOCAL AUTHORITIES TO PROVIDE A SUPPLY OF WATER FOR FIRE PURPOSES—HOW THE OBLIGATION MAY BE DISCHARGED—LOCAL GOVERNMENT ACT—LEGAL POSITION OF FIRE BRIGADES IN SCOTLAND—BURGH POLICE ACT—STATUTORY ARRANGEMENTS IN IRELAND—TOWNS IMPROVEMENT ACT—SPECIAL ACTS—RIGHT TO PULL DOWN BUILDINGS—RESPONSIBILITY OF LOCAL AUTHORITIES UNDER EMPLOYERS' LIABILITY ACT

It has been observed in a preceding chapter that local authorities have ample legal powers to establish and maintain Fire Brigades out of the rates. I propose to enumerate in this chapter the various Acts of Parliament by which the maintenance of Fire Brigades is now regulated. It is an unfortunate result of the slip-shod methods of the last few years that some of the most important legislation on the subject of Fire Protection consists of un-repealed portions of acts which are otherwise obselete, and occurs under such varied headings as Lighting and Watching, Local Government, Police, Poor Law, and Public Health.

The *Lighting and Watching Act*, 1833 (*William IV.*, 3 *and* 4, *Cap.* 90, *Sec.* 44), enacts:—

"That it shall be lawful for the said Inspectors from time to time to provide and keep up fire engines, with pipes and other utensils proper for the same for the use of the Parish adopting the Provisions of this Act, and to provide

a proper place or places for keeping of the same, and to place such engines under the care of some proper person or persons, and to make him or them such allowance for his or their trouble as may be thought reasonable, and the expenses attending the providing and keeping of such engines shall be paid out of the money authorised to be received by the Inspectors under the provision of this Act "

With regard to Urban District Councils this Act was superseded by Sec 163 of the Public Health Act of 1875, referred to later, and Sec 5 of the Local Government Act of 1894 authorises its adoption by the Parish meeting of Rural Councils

The *Towns Police Clauses Act*, 1847 (10 *and* 11 *Vic*, *Cap* 89, *Secs* 32 *and* 33) gives the following powers —

"That the Commissioners may purchase or provide such engines for extinguishing fire, and such water *buckets, pipes, and other appurtenances for such engines, and such fire escapes, and other implements for safety or* use in case of fire, and may purchase, keep, or hire, such horses for drawing such engines as they think fit, and may build, provide or hire, places for keeping such engines with their appurtenances, and may employ a proper number of persons to act as firemen, and may make such rules for their regulation as they think proper, and give such firemen and other persons such salaries and such rewards for their exertions in cases of fire as they think fit"

"The Commissioners may send such engines with their appurtenances, and the said firemen, beyond the limits of the Special Act, for extinguishing fire in the neighbourhood of the said limits, and the owner of the lands or buildings where such fire shall have happened shall, in such case, defray the actual expense which may thereby be incurred, and shall also pay to the Commissioners a reasonable charge for the use of such engines with their appurtenances, and for the attendance of such firemen, and in case of any difference between the Commissioners and the owner of such land or buildings, the amount of the said expenses and charge, as well as the propriety of sending the said engines and firemen, as aforesaid, for extinguishing such fire (if the propriety thereof be disputed) shall be determined by two justices, whose decision shall be final; and the amount of the said expenses and charge shall be recovered by the Commissioners as damages "

The powers given to the Commissioners in the above Act are now under the Public Health Act exercised by Town Councils, Urban Sanitary Authorities, or Rural Sanitary Authorities

The Act does not extend to Scotland, Ireland, or the Metropolis, at least as far as its provisions in regard to fire extinguishing are concerned

In those parishes where no Local Board, Urban or Rural Sanitary Authority exists a Fire Brigade may be maintained under the *Poor Law Amendment Act*, 1867 (30 *and* 31 *Vic* , *cap* 106, *Sec* 29), which enacts that —

" If the Vestry of any parish where there is no Town Council, Local Board, or other authority competent to provide the same, after due notice, shall resolve that the overseers shall provide any fire engine, ladder, or fire escape for general use in the parish, the overseers shall provide the same, and pay out of the poor-rate the cost thereof, and of procuring a proper place wherein to keep the same, and of maintaining it, as well as any such engine, ladder, or escape acquired by the parish in any other manner for such use, in a fit state of repair, and the charges of such persons as may be necessary for the use thereof, and the cost of suitable implements and accoutrements " This section is now incorporated in the Local Government Act of 1894

It will be observed that the authorities, although they have permissive powers to maintain Fire Brigades, are not by law compelled to do so It is, however, compulsory upon them to provide an efficient supply of water By the *Public Health Act*, 1875 (38 *and* 39 *Vic., cap.* 55, *Sec.* 4), it is enjoined that —

"Every Urban Authority shall cause fire plugs and all necessary works, machinery, and assistance for securing an efficient supply of water in case of fire to be provided and maintained, and for this purpose they may enter into any agreement with any water company or person, and they shall paint or mark on the buildings or walls within the streets words or marks near to such fire plugs to denote the situation thereof, and do such other things for the purposes aforesaid as they may deem expedient"

By this section it will be seen that Urban Authorities are compelled to provide water at high pressure for fire extinction In other clauses, which need not be set out at large here, it is enacted that they may make this provision either by establishing Water Works themselves or by entering into a contract with a Water Company, or in any other way which may seem expedient

Should the Authority have concluded a contract which includes a supply of water for fire purposes, and default be made by the company in supplying the same in the proper quantity and at a sufficiently high pressure, the Urban Authority may bring an action for damages for breach of contract An opinion has become prevalent that if an Urban Authority fails to make the necessary provision for obtaining a water supply for fires any ratepayer who suffers may bring an action for damages against the Authority Such, however, is not the case Should the Authority neglect or refuse to carry out this or any other provision of the Act, complaint has to be made of the default to the Local Government Board, which, under Section 299 of the Act, orders an inquiry to be made into the circumstances If satisfied that the complaint is well-founded, the Local Government Board is directed in the same section to "make an order limiting the time for the performance of their duty in the matter of such complaint" If the Authority still refuses to perform the work, either of two courses may be adopted The order "may be enforced by a writ of mandamus, or the Local Government Board may appoint some person to perform such duty" This person may be invested for the time with all the powers of the Urban Authority, and may even levy rates; he takes over all the money in possession of the Authority, levies rates for any further supplies he may require, and carries out the work in accordance with the order of the Board, he then resigns his functions, and hands over the balance of his funds to the Urban Authority again, which forthwith resumes the *status quo ante*

Thus a defaulting Local Board may be compelled to carry out the duty entailed upon it by the Act, but there does not appear to be any liability for losses caused to any ratepayer by its neglect or refusal

The *Local Government Act,* 1894 (56 *and* 57 *Vic*, *cap* 73, *Sec* 6 *and* 7), provides that —

"Upon the Parish Council of a rural parish coming into office, there shall be transferred to that Council —

"(*c*) The powers, duties, and liabilities of the overseers, or of the Churchwardens and overseers of the Parish with respect to—

The provision of parish books and a vestry room or parochial office, parish chest, fire engine, fire escapes, or matters thereto

As from the appointed day in every rural parish the Parish Meeting shall, exclusively, have the power of adopting any of the following acts, inclusive of any acts amending the same, all of which acts are in this act referred to as 'the adoptive acts,' namely —

(*a*) The Lighting and Watching Act, 1833"

The *Parish Fire Engines Act,* 1898 (61 *and* 62 *Vic*, *Cap* 38, *Secs* 1 *and* 2) relates to the powers of Parish Councils —

"The power of a Parish Council under Sec 29 of the Poor Law Amendment Act, 1867, or Sec. 44 of the Lighting and Watching Act, 1833, as respectively amended by Secs 6 and 7 of the Local Government Act, 1894, to provide a fire engine for their Parish, shall include power to agree with the Council of any neighbouring borough or district that any fire engines with their appurtenances and firemen provided by the Council of that borough or district shall be used for extinguishing fires in the parish

"Where a fire engine is sent beyond the limits of a borough or district in pursuance of any such agreement, the owner of the lands or buildings where the fire occurred shall not by reason thereof be liable for any expense or charge under Sec 33 of the Towns Police Clauses Act, 1847"

I am afraid that the exact position of the various local authorities in regard to their rights and duties, so far as these relate to the maintenance of fire brigades, will not be easily understood, but the fault is that of Parliament Legislation by reference to former Acts is now largely followed, and it is productive of much practical inconvenience

Fire Brigades in Scotland are maintained under the *Burgh Police (Scotland) Act,* 1892 (55 *and* 56 *Vic*, *Cap* 55) The portions referring to fire protection are as follows —

Sec 291 —"The Commissioners may purchase or provide such engines for extinguishing fire, and such water buckets, pipes, and other appurtenances for such engines and such fire escapes and other implements for safety or use in case of fire, and may purchase, keep, or hire such horses for drawing such engines, as they think fit, and may build, provide, or hire places for keeping such engines with their appurtenances, and may employ a proper number of persons to act as firemen, and to be named the fire brigade, and may appoint a firemaster, who may be the chief constable, and who shall be the superintendent of the fire brigade, and may provide suitable dwellings for such firemaster and firemen, and make such rules for their regulation as they think proper, and give such firemaster and firemen such salaries and such rewards for their exertions in cases of fire as they think fit."

Sec 292.—"The Commissioners may cause to be put up, at or upon the railways or in or upon the walls of buildings or elsewhere in the streets, public or private fire alarms, battery boxes and index plates, or make markings showing the position of the fireplugs in such streets and places, and may put down fire plugs in any footpath or street, whether public or private, and may attach telephone or telegraph wires necessary for the working of the fire establishment to any land or heritage without being liable to any claim for compensation for so doing, and any person who shall cause any obstruction to the putting up of such plates or markings, or who shall pull down, injure, deface or destroy the same, or shall wantonly ring any such fire alarm, shall be liable to a penalty not exceeding five pounds for each offence, and any person feeling himself aggrieved as to the mode in which the Commissioners may carry out any of the powers herein contained may appeal to the sheriff, whose decision shall be final provided that no such telephone or telegraph wires shall be used, nor shall the powers herein contained be in any way exercised in contravention of the exclusive privileges conferred on Her Majesty's Postmaster-General by the Telegraph Act, 1869."

Sec 293.—"The fire brigade may enter and, if necessary, break into any building in the burgh being on fire, or any buildings or lands adjoining or near thereto, without the consent of any owner or occupier thereof respectively, and may do all such acts and things as they may deem necessary for extinguishing fire in any such building, or for protecting the same or rescuing any person or property therein from fire, and any damage in the exercise of such powers shall be deemed to be damage done by fire."

Sec. 294.—"The senior officer of the fire brigade present at any fire shall have the sole charge and control of all operations for the extinction of such fire, whether by the Commissioner's engines or appliances or any other or others, including the fixing of the positions of fire engines and apparatus, the attaching of hose to any water pipes or water supply, the shutting off the water from other parts of the building on fire or of adjoining buildings against which the water is to be directed."

Sec. 295.—"The senior officer of the fire brigade or of police present on the occasion of any fire shall be entitled, where he considers the same necessary, to enable the fire brigade to better discharge their duties, or for the protection of the hose or other appurtenances, or for the safety of the public, to shut up temporarily by means of a guard of constables or other persons, or a rope, chain, tressels or barricade, any street, court or passage in or near the place where such fire exists, and every person wilfully using such street, court or passage while it is temporarily shut up, without the consent of the fire brigade or police, shall be liable to a penalty not exceeding five pounds."

Sec. 296.—"The burgh prosecutor or deputy burgh prosecutor shall examine and take the evidence of all or any parties reasonably supposed by him to be able to give information as to how the fire originated, and any parties refusing to be examined shall be liable to a penalty not exceeding ten pounds, but parties suspected of wilful fire-raising shall not be bound to give evidence or be examined by the burgh prosecutor or deputy burgh prosecutor relative to such fire."

Sec. 297.—"The chief constable or chief officer of police shall, if he consider it necessary for the ends of justice, be entitled to retain possession of the premises in which the fire has occurred until twenty-four hours after the circumstances of the fire have been reported to the burgh prosecutor."

Sec. 298.—" The Commissioners or the firemaster may use such engines, with their appurtenances, and the said firemen, beyond the boundaries of the burgh, for extinguishing fire in the neighbourhood of the burgh, and the owner or, if the Commissioners think fit, the occupier of the premises where such fire shall have happened shall in such case defray the actual expense which may be thereby incurred, and shall also pay to the Commissioners a reasonable charge for the use of such engines, with their appurtenances, and for the attendance of such firemen, and in case of any difference between the Commissioners and the owner or occupier of such premises, the amount of the said expenses and charge shall be determined by the Sheriff, whose decision shall be final, and the amount of the said expenses and charge shall be recoverable by the Commissioners as any debt may be recovered "

Sec 299 —" The firemaster shall make up and deliver to the Commissioners a statement of the whole expense attending each fire, which shall include the wages payable to the firemen and other persons employed at it, the rewards or premiums which he recommends to be given to them, the outlay incurred in taking them and the engines to the spot where such fire occurred, and in obtaining a supply of water, and other the like expense, and such statement, in so far as approved of or as altered by the Commissioners, shall be *primâ facie* evidence of the amount of expenses attending the said fire "

In Scotland, under the *Local Government (Scotland) Act*, 1894, *Sec* 24 (1) (d), a fire engine accepted as a gift may be maintained

In Ireland the fire arrangements in those towns which have adopted *The Towns Improvement (Ireland) Act*, 1854 (17 *and* 18 *Vic* , *cap* 103), are made under Section 73 of that Act, &c

" The Commissioners may provide such engines for extinguishing fire, and such appurtenances for such engines, and such fire escapes and other implements for safety or use in case of fire, and keep or hire such horses for drawing such engines as they think fit, and employ a proper number of persons to act as firemen, and make such rules for their regulation as they think proper, and give such firemen and other persons such salaries and such rewards for their exertions in cases of fire as they think fit, and the Commissioners may send such engines and the said firemen beyond the boundaries of the town for extinguishing fire in the neighbourhood of the town and the owner of the premises shall in such case defray the actual expense which may be thereby incurred, and shall also pay to the Commissioners a reasonable charge for the use of such engines and for the attendance of such firemen, and the amount of the said expenses and charges, as well as the propriety of sending the said engines and firemen as aforesaid for extinguishing such fire (if the propriety thereof be disputed), shall be determined by the Justices at Petty Sessions, whose decision shall be final, and the amount of the said expenses and charges shall be recovered by the Commissioners as damages "

In addition to the general Acts mentioned above, many cities and towns have special Acts of Parliament relating to their individual circumstances, chiefly in the matter of charges for attendance at fires Amongst others are London, Edinburgh, Dublin, Manchester, Liverpool, Salford, Glasgow, and Belfast, extracts from the special Acts of these places will be found in Chapter 5

Many of these special Acts of Parliament give the Chief Officer of the Brigade power to break into or through, to take possession or pull down any premises for the purpose of putting an end to a fire, "doing as little damage as possible" Apart from this there is the Common Law right to pull down a house for the purpose of preventing the spread of fire This right was referred to by Recorder Fleetwood as far back as 1583, and in

1660 was distinctly confirmed by a judgment of the Court of the King's Bench, "Manby *v* Scott." This right would appear to belong to any interested party such as a neighbour, whether connected with the Fire Brigade or not. It is probable, however, that it is always open to the party who feels himself aggrieved to take proceedings against a Fire Brigade Chief Officer on the assumption that it was not necessary to pull down the building or that unnecessary damage had been caused in doing so The question would then become one of fact, and would be left to the jury, so that a Fire Brigade officer is not quite safe in ordering anything of the sort to be done, but I have never known an instance in which liability was incurred through pulling down or destroying buildings in this way With regard to the right of entry into buildings at fires, an interesting case was taken to the Appeal Court in April, 1893 In this case, Carter *v* Thomas, the appellant had been convicted of assault in the following circumstances Carter was a member of a Volunteer Brigade and Thomas a member of a Local Board Brigade formed under the Public Health Act, 1875 Thomas, acting under orders from his foreman to exclude everybody from the house, declined to allow Carter to pass, whereupon the assault was committed The judgment was upheld, the Judges maintaining that Carter had no legal right to be on the premises, while Thomas had

Where the members of a Fire Brigade are in receipt of a salary from the Local Authority, even although the salary may be nominal, the authority will be liable under the different Acts of Parliament affecting Employers' Liability and Workmen's Compensation for injury or death sustained by a fireman owing to a defect in apparatus belonging to the Authorities or from negligence on the part of an officer to whose orders the injured fireman was bound to comply, or from pure accident It is also possible that members of Volunteer Fire Brigades (so-called) may have a claim against a committee or superior officer by whom they are enrolled No case involving the point has been brought into Court, so far as I know, but the probability that such an action would lie is so great that I strongly advise everyone who conceivably may be held responsible to protect himself by insurance The premium is quite properly payable out of the ordinary funds of a fire brigade

CHAPTER IV

FIRE BRIGADE RULES AND REGULATIONS.

MODEL CODE OF REGULATIONS—WORKING RULES AT FIRES—EXAMPLES AT BIRMINGHAM (PROFESSIONAL BRIGADE), LIVERPOOL AND CARDIFF (POLICE BRIGADES), COVENTRY (CITY COUNCIL VOLUNTEER BRIGADE)—HASTINGS AND ST. LEONARDS (BOROUGH VOLUNTEER BRIGADE)—EXTRACTS—MESSRS. BASS, RATCLIFF AND GRETTON, AND "CLARNICO" (PRIVATE BRIGADES)

A CODE of rules for the regulation of the brigade and for the determination of questions which arise from time to time should be drawn up for every such organisation Where a brigade is more or less under the control of a town council or other local council, the rules must be settled after consultation with the authority interested, and must as a rule be confirmed by it The following code is recommended for those brigades which are independent of any local authority —

1 The brigade shall consist of a chief officer, 2nd officer, chief engineer, engineer and   firemen (or if the military designations be preferred, the names of the officers will be captain, first lieutenant, second lieutenant, and sergeant or engineer), with power to add to their number, and shall be called the city or borough of*   Fire Brigade.

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* It is advisable not to introduce the word Volunteer into the title of the brigade, because it has been held by at least one county court judge that a Volunteer Brigade holds itself out to the public as rendering gratuitous services at fires, and cannot therefore recover the amount of its charges or expenses. In any case it is often difficult to persuade property owners and others that Volunteer Brigades should receive payment for attendance at fires

2. The officers shall be elected by a general meeting of all the members of the brigade †

3. There shall be a Committee, consisting of the officers named in Rule 1, and two members elected by the brigade, and it shall be the duty of this Committee to superintend the collecting of subscriptions and accounts for charges at fires, to give orders for new apparatus, to arrange dates of competitions or outings, it shall also perform such other duties as are specially assigned to it in the following rules, or by a general meeting of the brigade The Committee shall hold office from one annual meeting to another and shall meet at least four times every year

4 The property of the brigade shall be vested in three trustees, to be appointed at a general meeting of the brigade, whose appointment shall be permanent unless at any time rescinded by a two-thirds majority of the members present at a general meeting

5 Each member shall promptly obey all orders which he may receive from those in authority over him, and shall conform to all regulations which may from time to time be made by the Committee or a general meeting of the brigade, in case of any default at a fire, the Chief Officer shall have power to deal with the matter temporarily, and the Committee finally in all cases, without appeal At a fire, the Commanding Officer shall have absolute authority for all purposes

6 Any matter of importance or general application, such as an alteration of the rules, &c , shall be decided at a general meeting of the brigade

7 Any appointment to membership of the brigade shall be made by a special general meeting to be called for the purpose by the Committee, and a majority of two-thirds

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† Officers are sometimes elected annually, and in many towns the plan has worked well, but, on the whole, however, it is perhaps not to be recommended It is sometimes usual to appoint other officers, hon. sec , hon solicitor, hon surgeon, collector, &c , but these are not required in every case

present shall be necessary to confer due election; in case of a vacancy occurring amongst the officers, a general meeting shall be called within fourteen days to fill the same, and a majority of two-thirds present shall be necessary to confer election.

8 Seven days' notice at least shall be given to each member of all General Meetings, and notices of Special General Meetings must state the business to be done at such meetings

9 The brigade shall provide each member with tunic, helmet, boots, trousers, belt, hatchet, and lantern, which must be kept in good condition, and returned to the Chief Officer for the time being, on the member retiring from the brigade

10 No member can be recognised at any drill or fire as a member of the Fire Brigade unless in his uniform, and no member shall appear in his uniform except he is on duty, or by the permission of the Chief Officer or officer in command

11 The brigade shall meet for drill, etc , not less than twelve times yearly, the time and place to be as directed by the Chief Officer

12 The Chief Officer, Engineer, and members of the brigade shall each in his turn serve fourteen days upon "station duty," and it shall be the duty of the member so serving to visit the engine-house each evening to inspect the apparatus, and such member shall be responsible that the engine, etc , are in perfect order and ready to turn out upon receipt of a call Any member refusing to serve his turn shall pay the sum of five shillings to the funds of the brigade

13 The brigade and engines shall attend at all fires within the city, borough, or parish, and may attend in the adjoining district if the Chief Officer or officer in command shall consider it expedient, and when attending a fire the brigade shall assist any other Fire Brigade that may be in attendance at such fire.

14. The Chief Officer or officer in command shall furnish his men with refreshments when on active duty if in his judgment such refreshments are required, but on no account shall spirituous liquors be furnished to the brigade by any other person

15. The above Rules can only be altered or repealed by special general meeting of the Brigade Each member shall be furnished with a copy and shall pledge himself by signature to conform thereto

The above is a simple code applicable in most of its details to the great majority of newly-formed Volunteer Brigades Sometimes it is thought well to make rules relating to many other matters of detail, such as the times of meetings, order of business, and a thousand other items, but these can better be left to the officers and committee It is not advisable to have to alter the rules whenever a slight variation has to be made in these little matters Neither is it desirable to construct an elaborate table of fines, these penalties can seldom or never be enforced The fine for non-acceptance of station duty under Rule 12 should, however, be rigorously carried out. This work is important, because unless properly performed there is no certainty that a brigade will be able to turn out without delay when a call arrives The smaller the brigade, and the fewer the number of "turns-out," the more necessary it is that station duty should have proper attention

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In addition to the rules concerning corporate matters, it would be advisable to have a separate set of regulations setting forth the duties of the various officers and other members of the brigade This will vary very considerably in different brigades, and it would be almost impossible to draw up a code which would be generally applicable. Some remarks upon the duties at fires usually apportioned to each officer and man will be found in the chapter on Practical Fire Fighting. Much depends upon the number of members in the brigade, the class of fires usually dealt with, the situation of the engine-house, the distance between that and the residence of the firemen, and the means of call adopted. It will, perhaps, be best to give *in extenso* a copy of one or two sets of regulations applying to Fire Brigades of different kinds, as this part of my subject applies to firemen of all classes

The subjoined is a statement of the duties of officers and men in the Birmingham Fire Brigade It is applicable to most brigades which have a permanent staff, and as detailing the organisation of one of the finest brigades in the world, is worthy of careful perusal —

BIRMINGHAM FIRE BRIGADE (PROFESSIONAL)

Chief Officer

He is responsible for the general administration of the Department, and for efficiently maintaining the condition and equipment of the Brigade, and carrying out such regulations and directions as may from time to time be made or given by the Sub-Committee

He is also empowered, in case of flagrant misconduct, to dismiss any member of the Brigade

He may, at his discretion, attend fires outside the City Boundary

Second Officer

His duties are —

To take control of the Brigade in the absence of the Chief Officer

To inspect the men and stables at the Chief Station, and enter his report thereon in the duty book.

To visit the Out Stations at uncertain hours

To turn out one Machine and all the men at the Chief Station at 8 p.m. every day (Sundays excepted).

To attend on the Chief Officer at 9 a.m every morning with the reports for the past twenty-four hours, and at other times, when necessary, to report verbally all cases of importance

Weather permitting, he is, at his discretion, to turn out two Machines and Escape from the Chief Station to a supposed fire in the neighbourhood, thereby making the officers and men conversant with the class of buildings to be protected and the water supply. The last regulation also applies to the officer in charge of the District Stations

Chief Engineer

His duties are —

To take control of the Brigade in the absence of both the Chief and Second Officers

To be responsible for the proper and efficient condition of the Machines and Appliances

To inspect the men and stables at the Chief Station at stated hours, and enter his report in the duty book

To visit the Out Stations and public and other buildings in the "A" Division which may be under the supervision of the Brigade once every week, or as often as may be required, reporting in the duty book the time of each visit and the state in which he finds the appliances

To read the Rules and Regulations to the men on parade on the first day of every month (Sundays excepted)

To instruct the men in all matters of duty, and to drill the men for one hour and a half every Friday (weather permitting)

He is expected to make himself thoroughly acquainted with the character of each man under his control, and to show an example to the men by his conduct and steady perseverance in the performance of his duties

In case of fire, to place the Machines and Apparatus so that they may not be injured by the fire, or by anything falling on them

Not to allow any leave of absence without the previous permission of the Chief or Second Officer.

To make out all reports of fires occurring on the "A" Division not later than 8 30 every morning

To inspect the men's clothing on the "A" Division every three months, reporting to the Chief Officer thereon

In his discretion, to grant the men permission to go upon an errand occupying not longer than 40 minutes, or to attend a place of worship

Engineer

His duties are —

To act in the absence of the Chief Engineer

To be responsible for the proper and efficient condition of the Steamers, and to have the whole of them thoroughly examined and steamed once a month, and to see that the water in the Boilers be varied from 1 in to 2 in every fortnight

On the first day of every month (Sunday excepted) to cause the whole of the wheels and moving parts of the Machines and Appliances to be greased, and to see that they are properly packed, stuffed, and washered, and that all nuts are protected with a twine stop

At fires where the Steamers are used, to take charge of the arrangements for the supply of water to and from the Steamers, and of the men told off for this duty

District and Station Officers

Their duties are —

To act in order of seniority in the absence of the Engineer.

To visit the various Stations and other Buildings in their respective Divisions, and to report thereon in a book provided for the purpose

To inspect the men's clothing in their respective Divisions every three months, reporting thereon

To arrange with the Divisional Police Superintendents for periodical fire-drill for Constables

To use their discretion with regard to turning out Machines to calls of fire.

To read the Rules and Regulations to the men of their respective Divisions on parade on the first day of every month (Sunday excepted)

Firemen

Their duties are —

To act in order of seniority in the absence of the District or Station Officers

On being ordered to take the branch at a fire, to take with him a large axe

On arrival at the fire, to give the axe to the Assistant, who will break open any door, etc , as directed, the axe being left outside the building on fire when it is certain that it is no longer required

On finding the fire subdued, to stop the supply of water, being very careful not to use any more than is necessary Bearing in mind that fire burns upwards, the branch is to be held in that direction, so that the water, after it has done its work on the burning matter above, will descend, extinguishing the fire as it does so This object is best attained by getting on a level with the whole of the burning matter as soon as possible, either by the staircase or ladders (as the case may be), so that the water will strike the fire

Not to wet onlookers at a fire, nor to take the hose through any premises adjoining those on fire if it can possibly be avoided, nor allow more than one man to remain, as an assistant with the branch When water is used from buckets it must be projected through the handpumps.

General Instructions

The following instructions are to be considered as general in their application, and not as containing rules of conduct for all circumstances which may have to be dealt with by firemen in the performance of their duties The men are expected to act in all cases with judgment and discretion, and in so far as they show these qualities, combined with zeal and activity, they will be qualifying themselves for promotion.

It is expected that every man will render prompt and cheerful obedience to the command of a Senior Officer, and exercise his duties as quietly as possible He will be careful not to annoy the inhabitants of houses he may be called upon to enter, and to treat all persons with civility, also to preserve presence of mind, and not to follow the advice or direction of any member of the public, but to refer those who apply to him for aid to the Officer in charge

He is not to take money or refreshments from any person at a fire, neither is he to enter a refreshment room of any kind without the previous permission of the Officer in charge, and in cases where permission is given he is to report himself to the same Officer on his return

He is not to call another fireman by his Christian name

He is not allowed to smoke in the street when in uniform

He is to make himself acquainted with the position of the hydrants in the City.

He is not allowed to wear any portion of his uniform when on leave of absence, or while suspended from duty.

He is to bear in mind that he has nothing to do with Police duty, but he will render the Police such assistance as he can without interfering with his own duty.

In going to a fire with the machines the two senior men are to stand forward, one on each side of the driver, and warn all persons in the roadway by sounding the gong. The rest of the men are to keep their seats.

The Senior Officer, while proceeding to a fire, will tell off the men to attach a jet to the mains (if required) on their arrival, as follows:—

No. 1.—Take the branch and large axe

No. 2.—First length of hose, then assist No. 1 with the branch

No. 3.—Stand by with second length of hose.

No. 4.—Take the standpipe

No. 5.—Take hydrant key and open hydrant

No. 6.—Hand out the gear, rug up horses, then assist with the hose, etc

(Tell off a junior man as No. 1, and the turncocks as Nos. 4 and 5.)

No private person must be allowed to ride on any of the machines

On arriving at a fire, only the two Senior Officers, along with the firemen told off for the purpose, will dismount; the rest of the men will keep their seats and wait instructions

The Officer in charge at a fire will attend to no instructions except such as he may receive from his Senior Officer

At a fire no door is to be broken open or forced if it can possibly be prevented When a door has been broken open, a Fireman or Police Officer must be left in charge, or a padlock put on the door

The Officer in charge at a fire may remove, or cause to be be removed, any persons who interfere with the operations of the Brigade, and generally he may take any measures that appear expedient for the protection of life and property, with power to break into, or through, or take possession of, or pull down, any premises for the purpose of extinguishing a fire, doing as little damage as possible.

He may also, on any such occasions, cause the water to be shut off from the mains in any district, in order to give a greater supply and pressure of water in the district in which the fire has occurred.

The Officer (other than the Chief Officer) attending a fire is to return immediately to his station should his services and those of his men not be required, but in the event of their services being required, a message must be forwarded to inform the Chief Officer of the nature of the fire.

When a fireman is on duty and finds himself called upon to act as an Officer, he must decide promptly, and yet cautiously, what is to be done, and then do it

On receiving notice of a supposed fire, a member of the Brigade will report to his Divisional Station and proceed to the spot without hesitation

Members of the Brigade will make themselves thoroughly acquainted with the construction of the buildings in their respective districts, especially the entrances, and will caution persons against any risk of fire that may have been observed upon their premises, so that precautions may be taken against accident

Members of the Brigade are also expected to make themselves acquainted with the dangers arising from electricity, gas, carbide of calcium, acids, celluloid, and inflammable liquids

All complaints or communications to the Chief Officer must be made in writing by the men through the Second Officer.

LIVERPOOL FIRE BRIGADE (POLICE)

At Liverpool, where there is a Police Brigade, the following instructions have been issued —

The Fire Brigade.

The work of the Brigade will be the more efficient, if all, Officers and men, determine to work together, not for themselves, but for all, and with due regard for the comfort and feelings of each other

Every man must be ready to take up the responsibility and command which devolves upon the senior, and should understand thoroughly the proper use of every tool and appliance, and should know where to find it, and where to put it back when done with

Orders should be given properly, and carried out cheerfully and promptly, with the one idea of getting the work done as well and as quickly as possible

Turn-out

It is better to have too large a turn-out than too small a one, for most fires the first turn machine is enough, but when large numbers of people work or sleep on the premises the Horsed or Electric Escape must be turned out, as well as the steam motor, because though the latter may not be wanted to pump it will take plenty of men

At the same time good discretion must be used, in order to avoid turning out machines unnecessarily

Branchmen

A man must be told off for the first and second branches, but on arrival at the fire only the Inspector, Sergeant and First Branchman should go in, until more men are called for

It looks bad to see every man jump off and rush into the place, especially into shops and private houses, and then do nothing but get into somebody else's way, besides which, if every man has gone inside, there is nobody outside to bring in anything which may be called for

Branchmen must do all they can to avoid unnecessary water damage, not only to furniture or shop goods which will be destroyed by water, but also to machinery, tools and the like which will suffer from rust

Noise and needless shouting must be avoided, the man who works without shouting and talking not only does more, but impresses the on-looker with the idea that he knows what he is about

Salvage.

Before leaving the place, if no Salvage man is being left, help the people to straighten up a bit, the poorer the place the more you should do to help those who have suffered by the fire

Return to Station

The machines must be made up at once as if they had not been out, any missing or damaged gear replaced from stores or sent to the shop for repairs, and the proper reports promptly made

The Alarm of Fire

During the daytime the Clerk, during the night time the Engineer Sergeant on Revolving Duty, is in charge of the office, but these orders apply to anybody who happens to be in charge of the office for the time being

Coolness and silence are the most necessary things to be kept, don't let the other men worry you with questions, tell them to hold their tongues or clear out, the last is the best

When the alarm comes, ring the Station bells at once, and then get as complete a message as possible, the place and nature of the premises, and if the alarm comes from outside, the telephone number

Give the alarm to the Officer or Sergeant going with the turn-out and then inform the Superintendent, the Inspectors also that are out or in quarters, and the Salvage Corps

Write down the message you get from the scene of the fire on the proper form for future reference, and be sure that the Officer or Sergeant left in charge knows what has gone out, so that he can see that the next machine which may be required is ready

Brigade Inspectors

Your duties consist of duty with the Brigade, Station duties, and administrative duties, such as visiting out-

stations and other places under inspection of the Brigade, and making enquiries necessary for rendering Fire Accounts

When you come on duty at the C F S first see the men, then take a run through the Station and see that everything is right, the Station Engine Room, Spare Engine House and Quarters in order, everything in its place, clean and ready for use

If both Brigade Inspectors happen to be in the Station in the daytime when an alarm comes, the South Inspector will go with the First Turn

When leaving the scene of a fire, take a note of the men left on salvage duty and of the appliances left behind, and later on see that the latter are returned to their Stations, after being tested and overhauled at the C F S

You will go out inspecting as directed by the Chief Superintendent

Drill

The Senior Officer or Brigade Sergeant present in the Station will take charge of drills

Sergeants at Chief Fire Station

Engineer Sergeant on Permanent Day Duty

You work under the orders of the Engineer Inspector, and take charge of the workshops in his absence

You will turn out with the first turn if there is no other Sergeant in the Station, and stand by at any time in readiness to go with any other machine

On the alarm of a large fire get the Steam Tender ready

Engineer Sergeant Revolving

You work under the orders of the Engineer Inspector, when on night duty will take watch in the office, and receive and deal with the "Alarm of Fire"

Brigade Sergeant on Permanent Day Duty.

You act as Storekeeper, attending to receipts and issues and to repair hose.

Be careful when you come on duty to check any receipts or issues which have taken place during the night

You will turn out with the first turn machine in the absence of the other Brigade Sergeant, and will attend all large fires in all cases

Brigade Sergeant Revolving

When you come on duty be sure to find out from the Sergeant whom you relieve about any work unfinished, or of anything not available for use from any cause, also of any change in men or appliances

See that the machines are clean and the appliances in them in proper order and fit for use, also that the building is clean and tidy

When you go off duty be sure to tell the Sergeant who relieves you about any of the things mentioned above

There should be a perfect interchange of information between the two Sergeants of the watches, so that "I did not know," "I was not told," will not be given as a reason for some important matter having been neglected

Orderly

You are responsible for the cleanliness of the kitchens, have a good clean up once a week when the Brigade Sergeant can afford you some help

Boy

Your duties are well understood, you will attend all large fires and act as messenger to the Officers in charge

Firemen

Your duties are well understood also, but points to be remembered will be found under the heading of General Instructions.

Officer in Charge of District Station.

Keep a constant watch on all your appliances, and report at once anything which requires repair or replacement

Check your stock with your stock list frequently, especially after a fire

Keep your crew up to the mark, see that every man knows every appliance well, that every man can stoke the engine, and that everyone that has a driver's licence gets a chance of practice coming back from a fire, or on an occasional trial run

Bear the general instructions for work in mind when at a fire

Hints for Inspection

Sub-Stations

See all the men, see that they are clean and shaved, that their clothing and boots are clean and properly put on

Ask them if they have any complaints If a man has one, put it right or explain it right away, if you can't, say that you will submit it to the Chief Superintendent

Look over the machines, see that all the gear is on board and in its proper place, that everything is clean

Check the stores by the list and ask for anything missing

See what work is in hand and that it is being done properly

Go all over the station and see that everything is clean and in order in the engine-house, workshop, stores, and the men's quarters

Enter your visit in the Memorandum Book, remarking "All correct," or mentioning any fault you have to find

Turncock and Escapemen (Station)

Examine the appliances, see that they are all there and in good order

Ask when and where the last turn-out was, and what help the man was able to give.

Question the man in his knowledge of his district, the mains, etc., ask if any fire risks have been added, new buildings in district, and so on

Interest the men in their work by discussing their appliances, and anything in the way of suggestions which they can make for improving them, or for the condition under which they work.

Impress upon them the necessity of avoiding water damage, which often can be done by using the chemical extincteur instead of water from the main

CARDIFF FIRE BRIGADE (POLICE)

The following are in force in Cardiff, where there is a Police Brigade with the Head Constable as Chief Officer

The Fire Brigade is governed by the Watch Committee and controlled by the Head Constable

The Officers and men are subject to the rules and regulations issued by the Head Constable for their guidance and discipline, who may fine or suspend them for neglect of duty or breach of discipline, and may be dismissed by the Watch Committee

All members upon joining the Brigade serve the first year on probation, during which time they are thoroughly trained in Squad drill, Swimming, with the different methods of life saving, Fire Brigade drill, and First Aid to the Injured, in which they must obtain a certificate of the St John's Ambulance Association.

One month's notice must be given in writing before any officer or fireman can resign his appointment

In the absence of the Head Constable, the Superintendent will take charge of the Fire Brigade, and will be responsible to the Head Constable for the efficient discharge of the Brigade duties, both at the station and at fires.

Duties of Firemen.

They will be under the command of the Head Constable and Superintendent.

Their hours will be from 6 a m until 6 p m by day, and from 6 p m. to 6 a.m. by night

The men not living in quarters at the Station must reside as close as possible to the Central Fire Station, and they must not leave their quarters without permission, so that they may at all times be available for duty.

They must always be in uniform and ready to turn out when at the Station

They must perform their duties in a prompt and efficient manner and obey all orders of their superior officers

They must be civil and respectful in their demeanour and clean in their appearance

They must make themselves generally useful at the Station when not engaged in cleaning or repairing the appliances of the Brigade

Upon an alarm of fire being given at the Station they are to assist in turning out the engine, or to proceed to the scene of the fire at once with the Reel or Fire Escape as may be required.

After the fire is extinguished a number of men will be told off to take charge of the premises until further orders.

They will have to attend drill every Thursday afternoon, and they must make themselves acquainted with the positions of all the Fire Hydrants in the City

Each fireman must make himself thoroughly conversant with the telephone switchboard operating the Fire Alarm Boxes in the City.

Fire Alarm Boxes are stationed at suitable points throughout the City. They are in direct telephonic connection with the Central Fire Station They can also be used for police calls

Each box is equipped with what may be termed " First Aid " fire appliances and an ambulance stretcher.

First Instructions to Firemen.

To be prompt in carrying out all orders To at all times keep cool and avoid excitement.

To know the names of all the fire appliances and tools, also the uses of same

To know the different signs of fire and how a fire may be discovered in its early stages in all kinds of dwellings, warehouses, and offices

On discovering a fire to arouse and remove all persons in danger to a place of safety

To at once give the alarm to the Fire Station by fire alarm, private telephone, or messenger, always being sure that the messenger is a reliable person

Extinguish the fire if confident of being able to do so without risk to life or property If unable to cope with the fire, take care that all windows and doors are closed until proper means of extinguishing the fire can be brought into use

To know the different methods of dealing with chimney fires

To learn how to enter a room or building filled with smoke for the purpose of searching for a person, and the methods to adopt for rescuing a person, viz —

> To apply the fireman's lift and carry to a place of safety
>
> To rescue a person with an improvised rope made of bed clothes, etc
>
> Also improvised jumping sheets, such as a tarpaulin, bed clothing, or overcoats

To become acquainted with the positions of all Fire Alarms and Fire Hydrants.

No fireman to enter a building on fire alone, for should he be overcome by heat, smoke, etc , his life may be lost.

HASTINGS AND ST. LEONARDS (VOLUNTEER).

This Brigade is maintained partly by a grant from the Corporation and partly by public subscription.

1. The Brigade shall be called the "Hastings and St. Leonards Borough Volunteer Fire Brigade."

2. The Brigade shall consist of a Captain, Lieutenants, and Honorary Treasurer, who shall be the officers, also Secretary, Surgeon, Chaplain, Foremen, Engineers, Sub-Engineers, Pioneers, Messengers, and Supernumeraries, and such honorary Members as may be determined by the General Committee

3. The Property of the Brigade (excepting such as belongs to the Corporation) shall be and is hereby vested in the Officers of the Brigade for the time being

4. That the affairs of the Brigade shall be administered by a Committee called the General Committee, such Committee to consist of the Officers, Foremen of Sections, Engineer in charge of Sub-Section, and two members of each Section, who are to be chosen annually in the month of March, and a Finance Committee, consisting of the Officers and the Foremen of Sections, five to form a quorum

5. That the General Committee shall be called together at least once a quarter, or as often as may be deemed necessary for the transaction of the business of the Brigade

6. That the General Committee shall confirm all elections, and shall have power to suspend or discharge Members, and shall hear and decide all matters in dispute in connection with the Brigade Their decision to be final; ten to form a quorum

7. That the Finance Committee shall have the control of the Funds of the Brigade, and that no liability shall be incurred, or payment made, until same has been submitted to them for their approval

8. That no order shall be given on behalf of the Brigade except upon a printed form, to be signed by the Secretary

and the Chairman of meeting at which expenditure is sanctioned; all accounts passed for payment shall be initialed by the Chairman as aforesaid

9 That the Captain or Senior Officer present shall be Chairman of all meetings of the Brigade

10 That the Treasurer or Secretary shall present at each Finance Meeting a statement of the Funds of the Brigade.

11 Any person desirous of becoming a Member of the Brigade shall apply, giving particulars of age, occupation, etc , to the Foreman in charge of the District in which he resides It shall be considered necessary that the candidate shall reside within a reasonable distance from the Section House, so as to enable his electric call to be readily fixed Each candidate selected shall satisfactorily pass the Doctor's examination, and shall sign a form of declaration as approved Each Section shall select its own Foreman, Engineer, Sub-Engineer, Pioneers, Supernumeraries, etc., but all elections and promotions shall be submitted to the General Committee for confirmation and approval, and their decision shall be final

12 Any Member wishing to leave the Brigade shall give in writing to the Captain at least 14 clear days' notice of his intention so to do, and his reasons, and shall, on or before the expiration of such 14 days, deliver up to the Captain or Foreman of his Section his uniform and all property belonging to the Brigade with which he may have been entrusted, and a proper receipt shall be given by such for same

13 The age limit at which a Fireman under the rank of Foreman shall cease to be a Member of the Brigade shall be 55 years, unless otherwise determined by the General Committee

14 The Uniform of the Brigade shall consist of tunics, trousers, helmet, belt, fire boots, hatchet, wrench, life line, and cap, which shall be the property of the Brigade, and shall be worn only at fires, drills, and other assemblies of

the Brigade Every Member is expected (as far as possible) to keep his Uniform clean and in good order

15. That some sufficient distinction shall be made in the Uniform of the various ranks of the Brigade, subject to the discretion of the General Committee

16 That the drills for each month shall be arranged at a meeting of the Finance Committee Notification of such drills shall be sent by the Secretary to the Officers and to the Foremen of each Section A record of all drills is to be kept in a book provided for the purpose

16A. The Foremen are to send to the Secretary, on forms provided for the purpose, a report of all fires to which their Section is called This must be done as promptly as possible after the fires occur

17 That the Captain shall have power to call such additional drills, foot drills, parades, etc , as he may consider necessary

18 That all Members of the Brigade shall, as far as possible, attend all Fires, Drills, Parades, and other assemblies of the Brigade to which they may be called, and shall promptly obey the orders of the Captain or other Officer in charge for the time being Absence from Fires, Drills, etc , must be satisfactorily explained to the Foreman of the Section, and should such explanation be considered unsatisfactory the matter shall be brought before the General Committee for their decision All Members are expected to perform their share of Cleaning Drills, etc Cases of repeated absence from or neglect of duty must be reported to the Captain by the Foreman of Section concerned, and may be dealt with summarily by the Finance Committee, but the offending Member shall have the right of appealing to the General Committee, whose decision shall be final

18A. In the event of a Member requiring leave of absence for a period owing to illness, or any other cause, application must be made through his Foreman to the Captain, and should an extension of such leave be required, further application must from time to time be made. Any Fireman who intends being away from home for one night or longer is required to notify his Foreman to that effect, and a Foreman who intends to be away for a like period is requested to inform the Captain of the fact

19 That the Captain or Lieutenant shall be in charge of the arrangements at all fires, drills, etc , and all commands are to emanate from them Should both the Captain and the Lieutenant be absent, the Foreman in charge of the District in which the fire occurs shall temporarily take command. Should a Member of the Brigade be guilty of disorderly or improper conduct, or be worse for liquor, or commit any act which, in the opinion of the Officer commanding, may bring discredit on the Brigade, the said Officer shall have the power to suspend him from his duties, and bring his conduct before the General Committee, who shall have the power to fine or dismiss him

20 The Captain or other Officer in command at Fires or Drills shall furnish his men with refreshments, when on active duty, if in his opinion the same be necessary, but on no account shall any intoxicating liquors be supplied by any other persons or be accepted by a Fireman without the consent of the Captain or other Officer in command

21 The Brigade shall attend all fires that occur within the Borough when called upon The attendance at Fires beyond the Borough Boundary shall be at the discretion of the Captain, or Officer in charge in his absence, and under no circumstances is a Section to proceed to answer a call to a fire outside the Borough Boundaries until a direct command is received from the Captain or Officer in charge for the time being.

22. No Member on duty at a Fire shall leave the scene of such Fire, under any pretence whatever, except by order or leave of the Captain, or, in his absence, the Officer in charge of the operations.

23. That the Committee shall have power to reimburse any Member of the Brigade for any loss of time when

employed on any special duty, under the direction of the Captain, Foreman, or Officer in charge; and, in the event of any Member being injured while in the execution of such duty, the Committee shall have power to make him such compensation as they may think fit for such injury, out of the Funds of the Brigade, and in all cases money due for watching shall be paid by the Secretary or Treasurer on the Saturday following the day of the Fire Money recovered for watching shall be paid into the Funds of the Brigade

24 That the Foremen shall be held responsible for the condition of all the appliances, gear, etc , in use by their Section, that they periodically inspect same, and promptly report to the Captain any defect, deficiency, or requirement.

25 That the various Sections shall inspect and report upon the fire appliances at public buildings, places of entertainment, and private establishments situated within their District, when called upon to do so.

26 That the Secretary keep a register of all fires, all clothing issued, and also the names and addresses of the Members of the Brigade (a copy of the latter to be sent to the Police Officials), and that Members be required to notify the Secretary through their Foreman of any change of address

27. That there shall be a Storekeeper, who shall have the custody of all Stores and Uniforms not in use, and the Secretary keep a register of all such stores and Uniforms, wherein shall be entered all articles given out of, or received by him into, store, for which a receipt shall be taken, or given, as the case may be, and shall produce such register when called upon to do so by the Captain

28 Two auditors shall be appointed from the Members at the Annual General Meeting, to audit the accounts of the Brigade, which shall be made up to the 31st day of December in each year, and shall be an exact statement of the actual financial position of the Brigade.

29. A General Meeting of the whole of the Brigade shall be held as early as possible in the first quarter of each year, when the annual report and accounts shall be presented.

30. Should a vacancy occur by the retirement or death of an Officer of the Brigade, a successor may be elected, at a General Meeting of the Brigade, but the General Committee is empowered to elect any paid official or officials.

31 That the rules of the Brigade for the time being in force shall be binding on all Members of the Brigade No alterations shall be made in these rules except at a General Meeting called for that purpose by seven clear days' notice in writing

32 On receipt by the Captain of a requisition signed by twenty or more Members of the Brigade, he shall instruct the Secretary to call a General Meeting, not more than 14 days to elapse between receipt of requisition and date of Meeting

33 That every Member of the Brigade shall be insured against accidents in such an amount as at present (January 1st, 1907) stands under policy 58,421, London Guarantee and Accident Company, Limited The Secretary to be held responsible for the proper maintenance and renewal of said policy.

34. Every Member of the Brigade and all Members subsequently joining are to receive a copy of the foregoing rules

COVENTRY VOLUNTEER FIRE BRIGADE

The following rules are in force —

1. Throughout these Rules "the Committee" means the Committee appointed by the City Council to carry into execution the powers of the Council under Secs 32 and 33 of the Town Police Clauses Act, 1847

2. Except when the Fire Brigade is called out for practice, drill, inspection, or fire service, all fire stations, fire engines, horses, hose, fire escapes, ladders, and other

appliances for extinguishing fires, or for use at fires, provided by the Committee, shall be in charge of the City Engineer, and the Station Officer and all persons employed at the Fire Station shall be under his control; but upon the Brigade being called out, as aforesaid, and until the completion of the service for which it is called out, such stations, engines, horses, appliances and men shall, subject to these Rules, be under the command of the Chief Officer or Senior Officer of the Brigade

3 The Brigade shall be called "The Coventry Volunteer Fire Brigade," and shall consist of a Chief Officer, a Station Officer, and such Officers and such number and classes of firemen as shall from time to time be appointed and determined by the Committee All members of the Brigade shall be appointed and may be dismissed by the Committee

4 Every fireman when first appointed shall be not less than 21 nor more than 40 years of age, provided nevertheless that every person who is a member of the Brigade when these Rules come into force may be re-appointed

5 Each member on being appointed shall subscribe his name to these Rules and Regulations in a book kept at the Town Clerk's office for that purpose, in proof of his willingness to submit to all such Rules and Regulations, and also to such alterations as may subsequently be made therein, and a copy of such Rules and Regulations shall be supplied to him by the Town Clerk

6 The Committee shall supply to each member on appointment such uniform and accoutrements for use when on duty as may from time to time be determined by the Committee, and will pay every member (except the Chief Officer) a retaining fee of £10 10s for each year that he remains a member

7. A member of the Brigade, except the Chief Officer, shall retire and become an Honorary Member, if an Officer on attaining the age of 60, and if a Fireman on attaining the age of 50, and shall be allowed to retain his uniform.

8 Any member wishing to resign shall give the Town Clerk one calendar month's notice, in writing, at the expiration of which he shall cease to be a member of the Brigade Any member resigning without giving such notice shall forfeit any money then due to him from the Committee on account of retaining fee or otherwise

9 On the resignation or dismissal of any member he shall return his uniform and accoutrements and all property of the Corporation in his possession to the Station Officer

10. Every member shall, except in case of illness or other excuse satisfactory to the Committee, attend at least two-thirds of the fires to which he shall be summoned in any year In default he shall be deemed to have resigned at the end of the year, and shall cease to be a member of the Brigade.

11 Any member changing his residence or leaving the place for one or more nights shall send previous notice, in writing, of such change or absence to the Chief Officer

12 No member shall appear in uniform in any public place except when on duty, or with the sanction of the Chief Officer

13 Every member on being called out for service at a fire within the City shall immediately equip himself in his uniform and proceed to the Fire Station, where he shall report himself to the officer in command If on arriving at the station he shall find that the other members of the Brigade have already gone to the fire, he shall at once proceed thereto, and on reaching the fire he shall, before engaging in any work, report himself to the officer in command.

14 Every member when on duty shall promptly and cheerfully obey all orders of his superior officers

15. Every member shall attend two-thirds of all drills and practices to which he is summoned in any year, unless in any case he shall have obtained leave of absence from the Chief Officer, or shall have some excuse satisfactory to

the Chief Officer Every member committing a breach of this rule shall pay a fine of 1s.

16. A half-yearly inspection of the Brigade shall be held at a time to be fixed by the Chief Officer. Seven days' notice of the day and hour of such inspection shall be given to each member Any member not having obtained leave of absence from the Chief Officer who shall fail to attend such inspection shall pay a fine of 2s 6d

17 The Chief Officer shall be responsible to the Committee for the discipline and efficiency of the Brigade, and for the proper conduct of all operations undertaken by the Brigade for the extinction of fire

18 The Chief Officer shall determine what drills and practices shall be held, and shall have power to order such drills and practices to be held at such times and places as he shall think fit, provided that, except in case of urgency, 48 hours' notice of the time and place of any drill or practice shall be given to every member of the Brigade

19 At every drill, practice, or inspection, and whenever the Brigade is called out for service at a fire, the Chief Officer shall have full control of the Brigade, and of the appliances, horses and drivers mentioned in Rule 2, and shall direct all operations and movements

20 The Chief Officer shall have power to fine or suspend any fireman guilty of misconduct, or insubordination on duty, or of any breach of these Rules Provided that no fine shall exceed five shillings, and that no suspension shall be for a longer period than a month, or until the next meeting of the Committee

21 The Chief Officer shall, at the end of each month, make a report in writing of the work done by the Brigade during the month, and shall as regards every fire attended by the Brigade report specially —

1 The situation and description of the premises and the names and addresses of the owners and occupiers

2. The time (*a*) of the alarm being given; (*b*) of the first despatch of assistance and the nature of such assistance; (*c*) of arrival at the fire

3. The origin of the fire as far as known

4 What appliances were taken to the fire and what brought into operation

5 Whether or not the premises were insured

6 The names of the members of the Brigade attending the fire and the time each member was engaged

The Chief Officer shall also state in such Report the names of any members of the Brigade fined or suspended by him, and the reasons for such action

Such monthly report shall be sent to the Town Clerk, and shall be laid before the Committee at its next meeting

22 In the absence of the Chief Officer the Senior Officer present shall exercise the powers of the Chief Officer under Rule 19, but shall report all matters occurring during his period of control to the Chief Officer

23 The Station Officer shall reside at the Central Fire Station, and shall have charge under the City Engineer of the Station and all the appliances mentioned in Rule 2, and shall keep the same in complete order and ready for immediate use

24 At all drills, practices, inspections, and fires the Station Officer shall be responsible to the Chief Officer for the proper order and working of the appliances in use

25 On receiving an alarm of fire, the Station Officer shall immediately call up the Brigade, and the senior member present shall take the direction of all operations until the arrival of an officer

26 The Station Officer shall keep a record of attendance at all drills and inspections in a book to be provided by the Committee No member shall be entered as in attendance unless he is in proper uniform. Such book

shall be laid before the Committee with the monthly report hereinbefore mentioned

27 The Committee shall appoint such number of officers as they shall consider necessary for the proper working of the Brigade, and in making any such appointment the Committee shall have regard to any recommendation made by the Chief Officer The Committee may, on the like recommendation, suspend or reduce any such officer

28 The Committee shall determine the rank, seniority, and duties of any officer appointed by them under the last preceding rule

29 Each officer shall at any practice, drill, inspection, or fire, take charge of any operation entrusted to him by the officer in command of the Brigade, and shall be responsible to such commanding officer for its due execution

30 No officer shall give any orders to the Brigade or anv member thereof on duty unless he is in uniform

31 All fines shall be paid to the Chief Officer and shall be applied for the benefit of the members of the Brigade

32 If the Committee shall require the residence of all or any of the members of the Brigade to be connected with the Central Fire Station or other central position by means of alarm bells or signals, every such member shall permit such bell or signal, with all necessary wires and other apparatus, to be fixed and connected to his residence, and shall obtain all necessary permissions from other persons interested in such residence, and every such member shall on retirement or resignation permit such bell or signal, wires and apparatus to be taken down, disconnected, or removed by the Committee, or any person or Company employed or under contract with them for that purpose, and shall obtain all necessary consents for that purpose from other persons interested as aforesaid

33 No part of the appliances shall be taken out of the City except with the permission of the Committee, or to

attend a fire which involves danger to human life, or to large and valuable buildings.

34. Not more than two officers and four firemen in addition to the necessary driver or drivers shall (except as hereinafter provided) leave the City at one time to assist at an outside fire In order to determine which firemen shall go to such fire, four metal checks shall be kept in an accessible place at the Fire Station, and the first four firemen arriving in uniform after the alarm given shall each take one of such checks and shall proceed to the fire The checks shall be returned after the fire The Chief Officer shall, by general or special order, select the officers to proceed to any such fire In the case of any outside fire at which, in the opinion of the Chief Officer, it is necessary for more than four firemen to attend, the Chief Officer may direct such additional number as he thinks fit to attend, and they shall attend accordingly

35 One fire engine in complete working order shall always remain in the City

The following are a few extracts from the Rules of various Brigades, all of the Volunteer class, controlled by the local Council or Corporation, dealing with special matters, or relating to questions on which there is considerable difference of opinion The organisation of these Brigades has been already recorded in Chapter II

ALTON (VOLUNTEER)

4 That the Brigade uniform consists of a helmet, tunic, trousers, boots, belt, axe, spanner and life line, all articles to be returned to the Secretary, if paid for out of the funds, on a Member leaving the Brigade, each Member to provide his own boots and trousers

12 That a fine of sixpence be charged to any Member not attending drill, unless a written notice be sent to the Officer in command previous to the hour of drill stating his inability to be present, the excuse to be accepted or rejected by the Officer, and 2s 6d in case of non-attendance at a fire If a Member is told off for duty at home (in case of a Country Fire) and goes to the fire he will be fined 1s All fines to be paid at the Annual General Meeting

13 That the Brigade meet for practice and testing the working of the engines the first Wednesday in each Month, and also on the third Monday in each of the six summer months

21 That all Members salute their superior officers on taking orders from them

24 That in the case of a Country fire two Members and two Probationers (to be taken in rotation) shall always remain in the Town in case their services should be required

27 That any Member leaving the Brigade or shifting his place of call within 12 months of the date after fixing electric call bell, will not be liable to pay more than 10s towards the cost of shifting the same, and if within two years not more than 5s The Committee to have power to remit a portion of this charge if they see fit to do so

HIGH WYCOMBE (VOLUNTEER)

8 Every new member when signing the rules shall deposit 10s as a guarantee of his due preservation of the uniform, this sum shall be forfeited to the Brigade if such member should leave within two years; but it shall be repaid in full upon his resigning at any subsequent time, upon his returning the uniform in good condition, and being at the time efficient

STAFFORD (VOLUNTEER)

16 All fines shall be paid to the Brigade Secretary before a member receives any payment for services rendered, or the fines will be deducted from his first payment If the amount he is entitled to receive for services rendered be not sufficient to cover the fines for which he is liable, the Committee may enforce payment of same, and every member by his signature on enrolment, shall be deemed to be bound by, and to agree to, each of these Rules and shall conform to the same

19 Before any new member is admitted into the Brigade, he shall procure a certificate from the Brigade Surgeon as regards health

SUTTON (VOLUNTEER)

14 The Station shall be open to all members between the hours of 8 p m and 10 p m for the purpose of meeting together, subject to the control of the Senior Officer in charge

15 Not more than four members shall be allowed to sleep in the Watch Room on any night

STOCKTON-ON-TEES (VOLUNTEER)

12 There are no fines in the Brigade for breach of discipline or drunkenness, but any Officer or Member so misconducting himself, either at Fires or at the Station, will be liable to dismissal or otherwise, at the option of the Captain

BASS, RATCLIFF AND GRETTON F B (PRIVATE)

Messrs Bass, Ratcliff and Gretton have a private Fire Brigade, whose Rules and Regulations are as follows .—

Superintendent

The Superintendent will be held responsible for the care and management of the steam and other engines, and all apparatus, implements, and things provided for use at fires, as well as the superintendence of all the men.

Also, that every article connected with the Engines, apparatus, implements, ladders, and things is always kept ready for use and in its proper place, and that at all times a supply of coal and prepared wood is kept on the Steam Fire Engines, and the fires laid ready for lighting

Also, that no article belonging to the Fire Brigade is used for any other purpose, on any pretext whatever

Also, that the Hose is properly dried, oiled and kept in good repair, the engines examined and cleaned, and the barrels of pumps and all working parts well oiled, so that the whole may be perfect and ready for immediate use

Also, that the Firemen take care of their clothes, belts, axes, and tools, and at all times turn out promptly and properly equipped on the alarm being given

Also, that no person rides upon any of the Engines in going to or returning from a Fire, unless such person belongs to the Fire Brigade

Also, that he makes himself well acquainted with the position of all sources of water supply in or near Messrs Bass and Co 's premises, and that the Deputy Superintendents have the same knowledge

Also that immediate notice be given, if a Fire breaks out on Messrs Bass and Co 's premises, to the other Brigades in the town

Also, for keeping an inventory of all articles of every description belonging to the Brigade, and a list of his men

Also, for seeing that all Electric and other communications are in proper working order

Also, for drilling the Firemen of each of the Breweries, the Cooperages, Maltings, Stores, and other parts of Messrs Bass and Co 's premises, once every fortnight; and generally for the efficiency of the Fire Brigade, its Staff Engines, Apparatus, and Hydrants, at all times

Deputy Superintendent

The Deputy Superintendent will act under the Superintendent, and in the event of his absence the Deputy will take his place, and carry out the rules herein laid down

The Deputy must also frequently examine and try the Hydrants and see that they are kept in good repair, more especially in frosty weather, and that no casks, or other materials or things, are put upon the Hydrants or other places where water is to be obtained in cases of Fire, and that every place indicating the position of a Hydrant is kept visible

Also, that he makes himself well acquainted with the position of all sources of water supply in or near Messrs Bass and Co 's premises

Engineer

The Engineer will act under the Superintendent and Deputy Superintendent, but he will be held responsible for both the Steam and Manual Engines being kept clean and in perfect working order, and at all times ready for use He must also examine and move the working parts once in every week, and particularly inspect the tubes in the boiler after the Engine has been at work, in his absence the Assistant Engineer is to take his place

On a call to a Fire the Engineer is to light the fire of the Steam Fire Engine, and get it ready for efficient working The Boiler in no case to be worked at a pressure exceeding 120 lbs per square inch The Safety Valve is not to be screwed down to a pressure exceeding 100 lbs , and must occasionally be raised by hand or otherwise, to prevent it sticking

When the work will admit of it, the Engineer is to occasionally fill his Boiler with water, as high as possible without allowing it to prime, and then blow off from all cocks, including the gauge cocks and the cocks of the steam pockets, using only one at a time, this is the best precaution against scale or scum, and when the fire is extinguished the Boiler is to be blown off and washed out

The Engineer must be careful to see that no soot is allowed to accumulate on the shell or tube plates of the Boiler, as this considerably reduces its steaming power.

The Engineer is held responsible that the water in the Boiler is always kept in sight of the gauge glass whenever the fire is alight, and in case of any accident, such as the failure of the feeding apparatus, rendering this impossible, he is immediately to draw the fire

A sufficient quantity of water must always be kept in the feed vessel for supplying the Boiler when the Engine is not at work

It being exceedingly dangerous to pour cold water on hot boiler plates, the Engineer must be particularly cautious about putting cold water into the Fire Box, and in case it should be absolutely necessary to do so, he must pour it on the Fire Bars only, and not on the inner shell of the Boiler or the tube plates

After the suction pipe has been taken out of the water, the Engine should be run round for a few strokes, in order to blow the remaining water out of the pump

The Boiler must be tested, once in six months at least, with cold water pressure of 180 lbs per square inch

The Engineer and Assistant Engineers must see that all the necessary Suction Pipes and Tools of every description are kept in their proper places at all times, and ready for immediate use

Alarm of Fire

The Alarm must be given to the Central Fire Station, which is connected by electric calls to the Superintendent and the Members of the Fire Brigade

Uniform

Each man will be furnished with boots, helmet, coat, waistbelt, axe, and wrench, to be renewed when required at the discretion of the Company.

Pay in Case of Call to a Fire

In case of Fire the men of the several denominations will be selected for service according to the order in which they arrive, and will receive pay according to scale, and any other men who may arrive before the Engine leaves the Station will receive half the scale fees as stand-by pay

Practice

There will be a weekly practice—one half of the Brigade will be drilled alternate weeks—in Summer time they will meet at the Fire Station on Wednesday at 5 15 p m , and in Winter on Saturday at 2 p m , the Engines (Manual and 2 Steamers) to be taken in turn, and a record shall be kept of the attendance at such practices, and at all fires

One of the Firemen in turn will be specially named by the Superintendent to examine every Monday morning, with the man named for the purpose in each department, the whole of the Cisterns, Fire Plugs, Stop Valves, Sluice Connections, Branch and Stand Pipes, Hose, Ladders, etc , to see that all are in complete order and ready for use, in all parts of Messrs Bass and Co 's premises, and a note to be made by them in a book provided for the purpose, of anything found out of place

General

Any member particularly distinguishing himself for zeal and activity will be recommended for extra reward

No payment will be made for practices unless the member is present

Any misbehaviour or want of zeal will be punished by a fine or removal from the Brigade, at the discretion of the Superintendent

Any member sick and unable to answer a call must immediately report same in writing to the Superintendent

The Brigade, after 1st January, 1904, will not turn out to any Fires outside Messrs Bass and Co 's premises, except by special request of the Town Fire Brigade, or by special summons to Brewery or Railway premises in the Borough.

In no case will Messrs Bass and Co 's Fire Brigade answer summonses to Fires outside a radius of 5 miles of the Parish Church of St Modwen's, unless called to the premises the property of the partners in the Company

Superannuation

Members of the Fire Brigade, on attaining the age of 55 years, if not earlier incapacitated, are to retire from this duty, and give up their cottage

In cases of not less than 15 years' service in the Fire Brigade a retiring allowance of 5s per week will be made

CLARNICO FIRE BRIGADE (PRIVATE)

The following are the Rules of the "Clarnico" Fire Brigade, the private brigade of Messrs Clarke, Nickolls and Coombs It is composed of the employees at their confectionery works at Hackney Wick

1 All hands will at once leave a room if a small hand whistle is blown, or on the words "All out" In going downstairs they will be careful to keep on the side away from the wall, and only in single file, so as to allow the firemen to get upstairs at once

2 An alarm of fire is raised by telling the man on the lift, or the stoker at any stokehole In the old rooms, by ringing the electric bell at the door In the Fancy Box or Pipe Fancy Department, by telling the gatekeeper at the main entrance

3. Stokers and the man at the lift, unless warned to the contrary, will, on hearing the hooter, bell or whistles, take up the alarm of fire

4 In the case of actual fire the big hooter and whistles will be blown continuously All firemen and ambulance men must at once leave their work and fall in at their posts.

5 In the case of an emergency drill, the signal is the same as for actual fire, and all men will at once leave their work and go to their posts

6 Foremen will receive notice half an hour before an emergency drill, and will be expected to make arrangements for the work to be carried on while the men are away, but must not tell the men that a drill is expected When the signal for fire or emergency drill is given they will be expected to see that the men at once leave their work if they have not already done so

7 All brigades will get ready and fall in at their stations with their hose and wait for orders, unless the fire is in their own yard, when they will at once deal with it Reserves will wait for orders A messenger will be sent to the other Brigades with orders, and no Brigade will dismiss until ordered

8 Fire drill will be carried out once a week, when the regular brigades will turn out, the signal for which will be given by the bell or whistle blowing for fifteen seconds

9 At night the big hooter will be blown or the bell rung.

CHAPTER V

CHARGES FOR ATTENDANCE AT FIRES

POWER OF VOLUNTEER BRIGADES TO CHARGE FOR ATTENDANCE AT FIRES—POWER OF LOCAL AUTHORITIES—LIST OF COUNTY COURT ACTIONS—CONDITIONS NECESSARY TO ENSURE PROBABLE SUCCESS AT LAW—SPECIAL LEGAL POWERS TO CHARGE IN CERTAIN CITIES—LIST OF CHARGES MADE BY VARIOUS BRIGADES—GENERAL REMARKS UPON METHODS OF CHARGING

A VOLUNTEER Fire Brigade has no special power to charge for work done by its members at fires It simply has the common right to demand payment for work done and performed It must therefore be prepared in every disputed case to prove that it received an order for the work from a properly authorised person, that it rendered efficient service, and that it had not previously held itself out to the public as performing Fire Brigade work gratuitously In some cases the word "Volunteer" in the title of the Brigade has proved a hindrance to the recovery of charges, but not in every instance, and this must be guarded against by advertising, say once or twice a year, in the local papers, that a charge will be made upon a scale which is either set out in the advertisement or which can be seen on application Many cases have been fought in the Law Courts in which the point of an alleged offer to render gratuitous service was involved, and judges have not always taken the same view of the question However, the generally accepted legal position of Volunteer Brigades with regard to charges at the present day is that they have no right to make a charge unless a contract is made for services rendered It is sufficient for the establishment of a contract that the Brigade shall have published a scale of charges, so as to attract public notice, and shall have been summoned to the fire by the owner of the property in danger, the Agent of an Insurance Office interested, or by a person authorised by either of them

It will be observed from the Town Police Clauses Act (see clause reprinted on page 24), that the Commissioners under the Act, that is to say the Rural and Urban District Councils, have the power to charge for the attendance of their Brigades outside their districts They cannot, however, charge for attendance within their districts This was decided in November, 1873, by the Court of Exchequer, consisting of Lord Chief Baron Kelly, and Barons Bramwell, Pigot, and Pollock, in the case of Drighlington Local Board *v* Bower The Court decided that the Act must be construed as excluding the right of Local Authorities to charge within their own district by the especial power given to charge outside it

In the matter of outside charges the meaning of the word "owner" in Section 33 of the Towns Police Clauses Act has been the cause of dispute It has been held in the Court of Appeal that the occupier cannot be the "owner" within the meaning of the Act, Sec 4 of the Public Health Act of 1875 being cited, in which the "owner" is stated to be the person receiving the rack rent of the lands or premises The precise wording of this Section is as follows —

"Owner means the person for the time being receiving the rack rents of the lands or premises in connection with which the word is used, whether on his own account, or as agent, or trustee, for any other person, or who would so receive the same if such lands or premises were let at rack rent

"Rack rent means rent which is not less than two-thirds of the net annual value of the property out of which the rent arises"

A somewhat singular position arises out of this fact If—as in the case of many farm fires—no buildings are in danger, the brigade attending can legally sue the owner of the property for expenses, although the benefit of the brigade's services is derived by the occupier As the occupier is not legally liable it is clear that even though he is insured there is no compulsion on the Insurance Office to indemnify, though it will frequently do so as a matter of grace, when the charges are reasonable

In Scotland, Sec 298 of the Burgh Police Act empowers the Commissioners to charge either the "owner" or the "occupier" of the premises "if they think fit"

In Ireland, as in England, the "owner" is the legally responsible person

Sec 33 of the Towns Police Clauses Act, by which the Commissioners may, at their discretion, send the brigade "beyond the limits of the Special Act" without a call, has often been the cause of dispute It is to be feared that this power has at different times given rise to a sort of competition to attend fires amongst brigades in neighbouring districts, with a resulting heavy bill of charges for the unfortunate owner of the endangered or destroyed premises This evil was more common some years ago than it is at the present day, and is one that is easily overcome by a little suitable organisation or understanding amongst brigades in districts where they are numerous, and where this trouble is likely to occur Parliament probably foresaw the contingency when the clause giving power to two Justices to determine the "propriety" of sending out the engines was inserted

For the purpose of shewing the usual course taken by Fire Brigades when their claims are disputed in the County Court, I reprint from the "Dictionary of Fires, Fire Brigades and Fire Appliances," the following list of cases, to which I have added others which have occurred since it was compiled The dates and other particulars refer to the issue of the *Fireman*, in which a more detailed account of the proceedings is to be found

VOL I, PAGE III November, 1877 GUILDFORD COUNTY COURT —*Haydon* v *Lee and Another* —*Action* brought by the Treasurer of the Guildford Fire Brigade against executors of Mr G Burt Amount in dispute £31 1s 0d Real defendants were the Insurance Company interested Liability of the owner admitted, but amount disputed, and £21 0s 0d paid into Court Verdict for plaintiff for £30 16s 0d, 5s charged for a messenger being disallowed

VOL II, PAGE 7 June, 1878 GUILDFORD COUNTY COURT—*Guildford Fire Brigade* v *Bartholomew*—*Action* for £39 12s 0d Plaint incorrectly entered in the name of the brigade instead of in the name of one member suing on behalf of the rest Judge amended title of cause Liability admitted but amount disputed Verdict for plaintiffs for amount claimed, with costs

VOL II, PAGE 142 February, 1879 CIRENCESTER COUNTY COURT—*Townsend* v *Cirencester Local Board*—Action by a fireman against the Local Board for £1 1s 6d, in respect of services at a fire Verdict for plaintiff, amount claimed

VOL II, PAGE 153 March, 1879 WELLINGBOROUGH COUNTY COURT—*Wellingborough Local Board* v *Eady*—Action against a farmer for £14 10s 6d Liability and amount appear both to have been in dispute Verdict for plaintiff, amount claimed, with costs

VOL II, PAGE 158 March, 1879 FALMOUTH COUNTY COURT—*Falmouth Volunteer Fire Brigade* v *Phœnix Insurance Company*—Action to recover £30 Brigade called to the fire by the Insurance Company Liability disputed on the ground that the brigade was a volunteer organisation The Judge (Mr Bere, Q C) ordered a non-suit

VOL III, PAGES 44, 68, and 87 September, 1879—ASHFORD (KENT) COUNTY COURT—*Ashford Fire Brigade* v *Richardson*—Action for £41 15s 6d Real defendants Kent Insurance Company £26 0s 6d paid into Court, but liability and amount both disputed Exhaustive judgment pronounced by Mr G Russell in favour of defendant, without costs, on the ground that the brigade held itself out to the public as a voluntary association performing work without payment. Notice of appeal given, but appeal not proceeded with, the case being compromised by the Insurance Company

VOL. III, PAGE 140 March, 1880 WEDNESBURY POLICE COURT—*Wednesbury Local Board of Health* v *Smith*—Summons for £19 5s 5d Disputed on the ground that the brigade rendered no effective service at fire and were not sent for Order made by the Bench for amount claimed, less charge for refreshments, which was not allowed

VOL. IV, PAGE 12 July, 1880 WAREHAM COUNTY COURT—*Hordle and Best* v *Drew*—Action by two members on behalf of the brigade for £15 Defendant pleaded that the Sun Fire Office was liable Judgment for plaintiffs for amount claimed

VOL IV, PAGES 13 and 117 July, 1880, and 8 January, 1881 BRADFORD COUNTY COURT, and on appeal, COURT OF COMMON PLEAS—*Spencer and Others* v *Stillings*—Action for £15 16s 6d Real defendants, Royal Insurance Company Judgment for plaintiffs for amount claimed, and special case stated for decision of the Court of Common Pleas Claim disputed on ground that action was not maintainable, because trustees could not sue as agents on behalf of a number of other persons, otherwise liability of the defendant admitted Justices Denman and Lindley gave judgment confirming judgment of the County Court in favour of plaintiffs

VOL. IV, PAGE 224 June, 1881 WORTHING COUNTY COURT—*Crouch* v *Blunden*—Action to recover £6 2s Claim disputed on ground that the brigade held itself out to the public as rendering services gratuitously, and that the Insurance Company and not the defendant was liable Judgment for plaintiff for amount claimed, with costs

VOL. VI, PAGE 74. October, 1882—SOUTHAMPTON POLICE COURT—*Southampton Corporation* v. *Warner*—

Summons to compel payment of £64 19s 7d. Real defendants, National Insurance Company By advice of the Court the Company paid full amount without an order being made

Vol. VII., Page 158 February, 1884 Salford Police Court —*Salford Corporation* v *Sun Fire Office and seven Companies* —Action for £407 16s 1d, amount of charges for attendance at a fire within the borough of Salford No question of liability, but amount disputed Proceedings taken under the Salford Improvement Act, 1862 (for extract see *Fireman*, Vol VII, page 66) Captain Shaw, of London, Fire Master Wilkins, of Edinburgh, Supts Matthews (Newcastle), Pound (Sheffield), and Smith (West Ham) called to prove that charges were excessive Verdict for £115, the companies had previously offered to compromise the case for £117 7s od

Vol VII, Page 219 May, 1884 Windsor County Court —*Ivey* v *Ranking* —Claim for £17 8s 2d by the Burnham Fire Brigade Real defendants, Northern Insurance Company Liability disputed Judgment for plaintiff for amount claimed

Vol VII, Page 220 May, 1884 St Albans County Court —*St Albans County Fire Brigade* v *Imperial Fire Office and five other Companies* Action for £19 10s Mr Kingan, occupier of the property, was joined with the fire office as defendant on application of plaintiffs' solicitor Amount and liability both disputed Judgment for defendant with leave to appeal, but plaintiffs' counsel stated the brigade had no funds for the purpose

Vol. VIII, Page 9 July, 1884 Otley County Court —*Otley Local Board of Health* v *Thomas Pepper* —Claim for £31 10s 6d for attendance at a farm outside the district of the Local Board Objection taken that expenses could only be recovered by summary proceedings before magistrates, but overruled in County Court Application to Mr Justice Field in Chambers, who referred the matter back to County Court on questions both on jurisdiction of Court and merits of case. County Court judge now decided that he had jurisdiction, and on the question of reasonableness of demand gave verdict for Local Board for £25 10s 6d

VOL VIII, PAGE 169 March, 1885 WHITCHURCH COUNTY COURT—*Pearson* v *Duce*—The plaintiff sued on behalf of the Whitchurch Volunteer Fire Brigade, of which he was the captain and hon sec, for £3 10s 6d, cost of horses and driver, paid by the brigade upon the occasion of a fire at defendant's farm Defendant sent a boy to Whitchurch to call "the brigade", there were two brigades, and the boy called them both The flames were extinguished before the arrival of the Volunteer Brigade, who made no charge except for horse hire Case compromised, the plaintiff accepting £2

VOL IX, PAGE 156 February, 1886 FARNWORTH (COUNTY) PETTY SESSIONS—*Farnworth Local Board of Health* v *Parker*—Action for £65 11s 10d for attendance of the Local Board engine at a farm which defendant occupied Dismissed without costs, the Bench considering that the tenant and owners should be summoned jointly Case for a superior Court was asked for and granted

VOL X, PAGE 111 December, 1886 PERTH SHERIFF COURT—*Perth City Fire Brigade* v *Bowers*—Action brought by the Police Superintendent against the Trustees of the late Mrs Bowers Amount in dispute, £12 12s 5d The defendants, who were proprietors of the house where the fire occurred, refused payment of one-half of the above sum on the ground of Clause 346 of the Police Act, 1862, and stated that the owners as a class and the occupiers as a class were each liable to one-half the expenses recoverable The Sheriff gave judgment for the amount sued for, with costs

VOL. X, PAGE 197 April, 1887 DARLINGTON COUNTY COURT — *Darlington Corporation* v *John Neasham*—Action for £26 5s 2d; £19 6s 2d paid into court. The services rendered were not in dispute, but amount was objected to as being excessive. Mr Stephenson, Captain of the Stockton Fire Brigade, was called, and stated that for a like service the Stockton Corporation would have charged £42 4s 6d. Judgment was given for the full amount, with costs

VOL. X , PAGE 218. May, 1887 SALFORD POLICE COURT —*Salford Corporation* v *John Miles* —Action for £4 12s 6d Defendant was a carrier, and the services rendered were for a fire which occurred on his lorry, laden with bales of cotton, when in Bury New Road, May, 1884 An order was made for the payment of the money

VOL. XI , PAGE 89 November, 1887 BOOTLE POLICE COURT —*Bootle Corporation* v *Courtney* —Action for £20 17s 6d , of which £9 11s had been paid outside the brigade Defendant refused to pay on the ground that he had never sent for nor employed the brigade As the neighbours had benefited by the attendance of the brigade, the Bench ordered the defendant to pay only £15, the balance to be obtained from the owners of the adjacent premises

VOL XII , PAGE 209 May, 1889 CHICHESTER COUNTY COURT — *Bognor Local Board* v *Upton* — Amount claimed £40 8s 6d , against the occupier, which was disputed as being excessive, especially an item included in it for refreshments Case practically defended by Sun Fire Office, who offered £30 in settlement The Court considered this very liberal and awarded it, adding "that if the matter had been left to them, without any offer being made, their award would have been much less"

VOL XV , PAGE 108 December, 1891 LIVERPOOL CITY POLICE COURT —*Liverpool Corporation* v *Sun Fire Office* —The Insurance Company objected to the method adopted in assessing a charge of £6 2s for wear and tear of plant, and contended they were only liable for the actual "wear and tear" caused by the particular services for which they were charged Judgment in favour of Corporation, and amount assessed at £4 3s 8½d. The Stipendiary decided that "wear and tear" was obviously different from damage and injury at a fire, and must be taken to mean expense incurred at fires in respect of wear and tear, which did not exhibit immediate definite or ascertainable results as were found in the case of damage or injury

VOL XV, PAGE 225 June, 1892 APPEAL CASE IN DIVISIONAL COURT OF QUEEN'S BENCH DIVISION —*Graham and Others* v *Nott-Bower and Another* —The appellants appealed against the decision of the Stipendiary of Liverpool (case above), allowing for "wear and tear" of engine and plant The object was to ascertain what the principle was upon which the Insurance Companies were to contribute to the expense of the Liverpool Fire Department Mr Justice Day and Mr Justice Charles, without calling on Counsel for the respondents, dismissed the appeal with costs, and refused to grant leave to appeal

VOL XV, PAGE 207 May, 1892 UXBRIDGE COUNTY COURT —*Uxbridge Local Board* v *G Ives* —Claim for £4 10s expenses incurred in attending fire on defendant's property Claim disputed on grounds that other brigades attended, and in consequence of scarceness of water the Uxbridge Brigade could not render assistance Claims had been put in by the other brigades and paid Proceedings taken out under the 171st Section of Public Health Act, 1875 Judgment for plaintiffs, with Court fees, amount to be paid in a month

VOL XV, PAGE 226 June, 1892 REDHILL COUNTY COURT —*Mayor of Reigate* v *Dunn* —£20 14s 2d was paid into Court, being two-thirds of amount claimed Defendant refused to pay more The Reigate firemen attended his farm to extinguish a fire When they thought they had done so they returned to Reigate, but were summoned about two hours afterwards, as the fire had broken out again. Verdict for defendant, on the ground that the complainant should not have charged for second visit

VOL. XV., PAGE 226. June, 1892 ROCHDALE COUNTY COURT.—*Clegg* v. *Rakewood Mill Company* — Amount claimed was £14 15s. 3d for services rendered at a fire at defendant's mill Claim disputed *in toto*, as attendance was not ordered by the defendants but by their foreman, which they would not recognise Judgment for plaintiff for £14 9s

VOL XVI, PAGE 97 November, 1892 BRENTFORD POLICE COURT — *Hanwell Local Board* v *Dodson* — Amount claimed £10 9s 6d Defendant contended Local Board could only charge the extra expense consequent on Fire Brigade being sent beyond the limits of the district, and also that the Board could not make a charge unless the engine was actually used, and unless the firemen actually took part in extinguishing the fire, which they did not in this instance Verdict for plaintiffs for amount claimed, without costs

VOL XVI, PAGE 112 December, 1892 STOURBRIDGE COUNTY COURT —*Stourbridge Fire Brigade* v *Morris and Mann* —Amount claimed £13 12s Mann summoned the Brigade, and Morris denied having sent Mann A correspondence ensued as to the liability, and both defendants were sued Verdict for plaintiffs against the two defendants for £13 2s, 10s being disallowed which had been paid for police assistance

VOL XVI, PAGE 150 February, 1893 AMERSHAM COUNTY COURT —*Mead* v *Fairbank* —Amount claimed was £8 14s Defendant stated that plaintiff had no right to sue as an individual (which he did as Secretary of the Amersham Volunteer Fire Brigade), as the brigade was a public company His Honour amended the plaint by making all the members of the brigade co-plaintiffs Defendant then denied liability as he himself did not send for the brigade In the March previous defendant's foreman ordered the timekeeper to fetch the brigade to extinguish a fire at defendant's works His Honour stopped the case, and found for the plaintiffs £7 12s., and costs, as he thought £2 2s. was sufficient to charge for the use of the engine

VOL. XVII , PAGE 27. August, 1893. LEOMINSTER BOROUGH POLICE COURT —*Town Clerk of Leominster* v. *Phillips* —Amount claimed was £43 18s 9d Objection was taken that the information was signed by a Justice of the Peace, who was also a member of the Corporation, and the magistrates decided that, in consequence of this fact, they were unable to hear the case

VOL XVII , PAGE 94 November, 1893 LEOMINSTER COUNTY POLICE COURT — *Leominster Corporation* v. *Phillips* — Amount claimed was £43 18s 9d Fire occurred just outside Borough boundary It was contended that defendant was owner within the meaning of the Town Police Clauses Act, 1847, Sec 33 Verdict for the defendant on the ground that he was not owner, and, therefore, not liable.

VOL XVII , PAGE 28 August, 1893 BRENTFORD PETTY SESSIONS — *Hanwell Local Board* v *Steel* — Amount claimed was £10 5s 6d Case disputed under the following circumstances —A fire occurred at Brentford on December 27th, 1892, and the police sent a telegraphic call to the Hanwell Fire Brigade When the brigade arrived the fire was virtually out, and the Hanwell engine did not get to work, in consequence of the Brentford Brigade successfully contending with the fire The magistrates found for the plaintiffs with £3 3s for costs, less the following deductions —£6 6s for use of engine was reduced to £3 3s , and 2s was disallowed for out-of-pocket expenses

VOL XVII , PAGE 45 September, 1893 NUNEATON COUNTY COURT —*Dr Peacock* (*Nuneaton Fire Brigade*) v *Wilkinson* —Amount claimed was £5 5s His Honour gave verdict for the defendants with costs, stating that a Fire Brigade could no more charge for attendance at fires than the Lifeboat Association could charge for putting out a lifeboat to render assistance at a wreck, or a hospital, which exists as a voluntary institution, might as well charge a man brought in with a broken leg. His Honour refused to give the plaintiff's solicitor a hearing, or to allow witnesses to be called

VOL. XVII., PAGE 45 July, 1893. BRENTFORD PETTY SESSIONS.—*Richmond Corporation* v. *Ramsey*—Amount claimed was £7. Verdict for the plaintiffs for amount claimed, less 5s charged for turncock, which was held to be unnecessary.

VOL. XVIII, PAGE 111 Nov, 1894 HUDDERSFIELD COUNTY COURT—*Armitage Bros* v *Calverley*—£3 5s was claimed for services of plaintiffs' Fire Brigade. Defendant held that he was not the owner or manager of the premises, which belonged to Messrs Hirst, Hanson & Sons, millowners Evidence was brought that the defendant had requested that the bill should be made out to him, and that after nine applications for the money had been made he offered to compromise Defendant was held liable, and verdict for £3 0s 6d was given, with stay of judgment for one month to allow him to sue Messrs. Hirst, Hanson and Sons if he chose

VOL. XIX, PAGE 167 Feb, 1896. ROMFORD COUNTY COURT—*Romford Town Fire Brigade* v *Alum China-Clay and Vitriol Company*—Amount claimed was £19 2s. 8d. for services and £3 10s. for damages Brigade was a Volunteer one and had been summoned by telegram. Judge held that no contract was proved, that there was no evidence that the rules of the Brigade had been circulated, or that charges had ever been paid to them except by an Insurance Company Judgment for the defendants

VOL. XX, PAGE 9 June, 1896 BOURNE (LINCOLNSHIRE) COUNTY COURT—*Bourne Parish Council* v. *Bettinson and Gardner*—Action brought to recover expenses for attendance at a farm fire within the parish. Plaintiffs' case was that the old Vestry had adopted a portion of the Act providing Fire apparatus, and arranged rules providing for the payment of all actual expenses, besides the use of the engine. Judgment was given for the defendants, the Judge holding that a portion of the Act only could not be adopted

VOL. XX., PAGE 149 Feb, 1897. EPSOM PETTY SESSIONS.—*Epsom Urban District Council* v *Farmer.*—Real defendants were the Law Fire Insurance Society. £8 2s was claimed for attendance at farm fire The Brigade was summoned by railway signalmen who saw the glare, but they were unable to work owing to lack of water Defendant disputed the propriety of the Brigade's attendance, remarking that the glare seen might have been due to a bonfire, and that on arrival their assistance was rejected Bench held that the attendance of the Brigade was reasonable and that they could not be expected to know that there was no water Charges were reduced to £7 10s 6d, one hour of the three charged for being deducted

VOL XXI, PAGE 48 July, 1897 EDGWARE PETTY SESSIONS—*Wealdstone District Council* v *Hucks*—Amount claimed £13 10s 9d Defendant contended that the charges were excessive, that the Brigade had done more damage than the value of the property saved He particularly objected to the charge of £2 1s for refreshments Defendant was ordered to pay the full amount with costs

VOL XXII, PAGE 169 Jan, 1899 OLDBURY DISTRICT POLICE COURT—*Oldbury District Council* v *Barnett*—£11 3s was claimed for the attendance of the Brigade at a fire at the defendant's brickworks Call was given by telephone, and fire was practically extinguished by the people on the premises before their arrival Defendant urged that the call was not given by an agent of his. An order for the payment of the full amount was made

VOL. XXIII, PAGE 209 April, 1900. TOTTENHAM POLICE COURT.—*Tottenham Urban District Council* v *Messrs Barratt and Co.*—Amount claimed, £25 for services and £10 damage to hose. Tottenham Brigade received call by alarm, and turned out, finding the Hornsey Brigade working on a fire hopelessly involving one block of buildings, and rapidly spreading to another. By the two brigades working together further progress of the fire was prevented £11 10s 6d had been offered in settlement and refused The charge of £1 per hour for use of the steamer was objected to Mr Folker, of the N F B U , was called as witness, and said that £5 5s. was sufficient charge for any engine, irrespective of the time it might be employed or of the damage done to it and other appliances; also the Tottenham Brigade should not have turned out unless called by the owner of the firm or one of his representatives, having regard to the fact that the defendants had an excellent private brigade of their own The Tottenham Council were awarded £28 10s 6d., each side to bear its own costs

VOL XXIV , PAGE 109 Nov , 1899 COURT OF QUEEN'S BENCH Before Mr Justice Lawrance and Mr. Justice Kennedy —*James and Others* v *Staines District Council* —This was an appeal from the decision of the Judge of the Chertsey County Court, dismissing an action brought by the lighting inspectors of the district of Egham, to recover payment for work done in assisting the Staines Fire Brigade at the latter's request The amount claimed was £9 13s 5d The County Court Judge held that the Superintendent had no authority to employ the plaintiff's engine The appeal was allowed, it being held that the word "provide" in Sec 32 of the Towns Police Clauses Act included the hiring of articles in an emergency, and that it was not only the right but the duty of the Superintendent to summon the assistance of the plaintiffs in the circumstances

VOL XXVI , PAGE 146 Dec , 1902 WEST RIDING POLICE COURT —*Corporation of Sheffield* v *Sykes* —The sum of £19 12s 6d was claimed in respect of attendance at a fire 5 miles from the station. The charges included £4 4s. for turn out and £10 for travelling the five miles.

Defence was that the Brigade was summoned by an absolutely unauthorised person by telephone, and that the Brigade took no steps to ascertain who he was. The owner had heard for the first time on entering the Court who had given the alarm In any case the charges were excessive. Judgment for £7 6s and costs

VOL. XXVIII, PAGE 41 Aug, 1904 HOLBEACH COUNTY COURT—*Bolton* v *Holbeach Urban District Council*—Action was brought by Mrs Ann Bolton, of Holbeach, claiming damages for trespass by the Holbeach Fire Brigade, and for taking water from a pit on the plaintiff's premises The claim was for £5, and the defendants paid 30s into Court. Evidence showed that the defendants took water from the plaintiff's pit without permission, pumped it nearly dry, and in consequence of this she had to provide water for her stock from another source, and was put to inconvenience and expense in conveying the same to the field The judge held that the Council were liable to pay for the water, but that the Fire Brigade had acted properly, and that the 30s paid into Court was sufficient Judgment was given for 30s without costs

VOL XXVIII, PAGE 185 March, 1905 RETFORD COUNTY COURT—*Mattersly Parish Council* v. *Gibson.*—Amount claimed was £3 17s 6d It was admitted that the defendant sent for the fire engine, but it was for an outbreak in the stackyard of a neighbour, Mr James Knowles, who had repudiated any liability, and said he did not authorise the defendant to send for the engine, which arrived after the fire was out His Honour nonsuited the plaintiff. If anyone was liable it was Mr. Knowles, upon whose farm the fire originated

VOL. XXIX, PAGE 91 Sept, 1905 MAIDSTONE COUNTY COURT—*West Malling Parish Council* v *Poole and Dubost.*—Brigade was summoned by telegram in the name of Dubost, the tenant of the farm at which the fire occurred. Evidence was brought to shew that this telegram was sent by a servant of the defendant who was subsequently paid for it and was told—according to the plaintiffs—that she had done "quite right" Defendants denied the latter statement, and said that at the time of the sending of the telegram they were not aware of the existence of the West Malling Fire Brigade His Honour held that it was a hard case, but looking at it from a strictly legal point of view, he must direct a non-suit with the usual costs

During the last few years no new point has been taken to Court relating to Fire Brigade charges, and the worst that is likely to happen to any brigade sueing for expenses, if it makes sure of a ground for action by a careful study of the foregoing cases, is to have the amount claimed reduced Summing up the matter it may be said that a local authority or brigade will, in all probability, be successful in the County Courts if it has observed the following conditions —

The brigade must have been sent for by the owner of the property, or a person who is a sufficient agent of the owner for this purpose, or, on arrival, it must obtain an order to get to work from such a person, and the suit must be instituted against the owner of the property even if it is insured, not against the Insurance Company

The scale of charges must be known in the district, and it must be made clear that the members of the brigade will make a charge if their attendance is requested

The suit must be instituted by one or more members of the brigade as trustees for the rest, not by the brigade as a body, because, in the latter case, if the Court refuses to amend the plaint, the action will be liable to non-suit, and a new suit will have to be begun This refers to cases in which a brigade not supported out of the rates is plaintiff in the action Where a paid fire brigade is maintained by the Corporation, which has allowed the brigade to go out of the town, the Corporation will, of course, take action to recover the amount of its charge.

Also, if the members of the brigade are really or nominally servants of a Local Authority, the charge will be recovered by the Authority, and that part of it which is due to the members of the brigade will be paid over to them

Perhaps the most prevalent misconception concerning Fire Brigade cases is, that the brigade has a right of action against Fire Insurance Companies interested. There is no right of action whatever against the Companies The right is entirely against the owner of the property, as explained previously, who, in his turn can claim against the Company, as long as he keeps within the limit of the amount of his policy, the expense of putting out the fire being a part of the loss that is insured against.

In several cities the right of the authorities to recover is based upon a special local Act of Parliament Below are extracts from local Acts which give special powers to Liverpool, Manchester, Salford, Edinburgh, Glasgow, Dublin and Belfast

The Corporation of *Liverpool* are given special powers under the Liverpool Improvement Act, 1862, Secs 162 to 165 —

Sec 162 "And whereas in the case of a fire certain extraordinary expenses are incurred, (that is to say) in wages of the fire police consequent upon the occasion in addition to their ordinary allowance, and in the pay of further assistance necessarily employed on such occasions, and in the wear and tear of engines and utensils, and by damage and injury sustained at such fires, and whereas the directors of various fire offices have voluntarily contributed to such extraordinary expenses, as well as to the original cost of such engines and utensils, but other fire offices, although interested in the preservation of property in Liverpool endangered by fires, have not, nor have the proprietors of property uninsured and so endangered, joined in contributing towards such extraordinary expenses; and whereas in the case of a fire happening it is expedient that all such extraordinary expenses aforesaid should be borne expressly by and amongst the persons interested in the preservation of property to which assistance has been *bonâ-fide* given or extended by such police in case of such fire, (that is to say) such extraordinary expense occasioned by any fire should be borne equally by and amongst all the respective Insurance Offices who have insured against fire, property to which assistance has been *bonâ-fide* given or extended as aforesaid by such police establishment against fire, and by and amongst all the respective owners or proprietors of uninsured property, to which property such assistance as aforesaid has been *bonâ-fide* given or extended by the said police establishment against such fire as aforesaid, in fair and equal proportions Be it therefore enacted that all such extraordinary expenses as aforesaid in the case of any fire shall be paid to the superintendent of the said fire police establishment by the said respective insurance offices so having insured as aforesaid, in proportion to the amount by them respectively insured on such property and by the respective proprietors of uninsured property, in proportion to the value of such respective property as aforesaid, Provided, that no such office shall in any case be liable to pay a larger sum than the amount by such office insured, or than the amount of the property upon which the insurance shall have been made by such office, nor shall any proprietor be liable to pay a larger sum than the amount of his property uninsured and that when any property is insured at two or more insurance offices, each such office shall only be liable in proportion to the respective amounts by such office insured and if any difference shall arise between the said respective offices and proprietors, or any of them, on the one part, and the said superintendent on the other, as to whether any such demand ought to be paid, or as to the amount of any such demand, then any two justices shall, on the application of the said superintendent, cause any director, resident agent of any such insurance office, or any such proprietor so disputing as aforesaid, to appear before them on reasonable summons or notice in that behalf, and shall, on hearing the parties, settle whether any, and if any, what amount ought to be paid to the said superintendent by any such party as aforesaid. and if it shall appear to such justices that any such sum ought to be paid the said justices shall by their order direct such party as aforesaid to pay to the said superintendent such sum to them so appearing to be due, together (if the said justices think fit) with reasonable costs to be fixed by the said justices, and the said party shall forthwith pay the said sum and costs to the said superintendent accordingly"

Sec 163 "And be it enacted, that if any such property as aforesaid be insured in any insurance office in any amount materially less than the value of the property in hazard, according to a reasonable estimate thereof, for the purpose of insurance, such insurance office shall not be liable to pay or contribute towards the expenses aforesaid in respect of more than the proportion which the amount so insured may bear to the whole value of such property, according to such estimate as aforesaid and the owner of any such property insured in any such office or offices in an amount in the whole so less than its value so estimated as aforesaid, shall be liable to pay or contribute towards the expenses as aforesaid in respect of the residue of the amount of the value so estimated as aforesaid as an uninsured proprietor to that extent, and shall be taken to be an owner of uninsured property to the amount of such residue for all purposes of this Act"

Sec 164 "And be it enacted, that in the case of any proceedings before two justices against any such insurance office, or agent, or director, as aforesaid, if it shall appear to the satisfaction of such justices that there is a *bonâ-fide* intention on the part of any such office to dispute the validity of any such insurance, then it shall be lawful for such justices, if they think fit to do so, to adjourn the proceedings from time to time to such time or times as they may think reasonable, for the purpose of postponing their decision until after any trial or other settlement of such dispute as aforesaid "

Sec 165 "And be it enacted, that in default of payment of the said sum and costs so ordered to be paid as aforesaid, such justices shall issue their warrant to levy the same by distress and sale of the goods and chattels of the person on whom such order for payment shall have been made "

Manchester is specially provided for under 7 and 8 Vic, Cap 40, Secs 115 to 122 —

Sec 118 "And be it enacted, that it shall be lawful for the Council to permit such engines, implements, and apparatus, and any part of the Fire Engine establishment, to proceed beyond the limits of the Borough for the extinguishing of fire happening to property in the neighbourhood thereof, and the owners of such property shall in such case defray the actual expense that may be thereby incurred, and shall also pay to the Council a reasonable charge for the use of such engines, implements, and apparatus and for the attendance of such Fire Police, and in case of difference between the Council and the owners of the said property, the amount of the said expenses and charge, as well as the propriety of the said engines, implements, and apparatus, and Fire Police having so proceeded as aforesaid for the extinguishing of such fire (if the propriety thereof be disputed) shall be summarily determined by any justice, whose decision shall be final and conclusive on all parties, and the amount of the said expenses and charge in dispute may be fixed by the justice, and shall be recovered in like manner as any penalty imposed by this Act is recoverable "

Sec 119 "And whereas in the case of a fire certain extraordinary expenses are incurred, that is to say, in wages of the Fire Police, consequent upon the occasion, in addition to their ordinary allowance, and in the pay of further assistants necessarily employed on such occasions, and in the wear and tear of engines and utensils, and by damage and injury sustained by such fires; and whereas it is expedient that the proprietors of property endangered by such fires should join in contributing towards such extraordinary expenses, and that all such extraordinary expenses, as aforesaid, should be borne expressly, in fair and equal proportions, by and amongst the persons interested in the preservation of property, to which assistance has been *boná-fide* given or extended by such police in case of such fire, be it therefore enacted, that all such extraordinary expenses, as aforesaid in the case of any fire, shall be paid to the Superintendent of the said Fire Police establishment by the respective proprietors of property in proportion to the value of such respective property, as aforesaid, provided that no proprietor shall be liable to pay a larger sum than the amount of his property, and if any difference shall arise between the said proprietors or any of them, on the one part, and the said Superintendent on the other, as to whether any such demand ought to be paid, or as to the amount of any such demand, then any two Justices shall, on the application of the said Superintendent, cause any proprietor so disputing, as aforesaid, to appear before them on reasonable summons or notice in that behalf and shall, on hearing the parties and their witnesses, settle whether any, and if any, what amount ought to be paid to the said Superintendent by such party as aforesaid, and if it shall appear to such Justices that any such amount ought to be paid, the said Justices shall by their order direct such party, as aforesaid, to pay the said Superintendent such sum to them so appearing to be due, together (if the said Justices shall think fit) with reasonable costs, to be fixed by the said Justices, and the said party shall forthwith pay the sum and costs to the said Superintendent accordingly"

Sec 120 "And be it enacted that, in default of payment of the said sum and costs so ordered to be paid as aforesaid, such Justices shall issue their warrant to levy the same by distress and sale of the goods and chattels of the person on whom such order for payment shall have been made."

Sec. 121 "And be it enacted that, instead of proceeding for the recovery of any such demand by summons and proceedings thereon before such Justices as aforesaid, the said Superintendent may recover the same against any such proprietor in an action of debt in the name of such Superintendent, in which he may declare generally that the defendant came and was indebted to him, as Superintendent of the Manchester Fire Police in the sum of (stating it) for assistance rendered to a certain property within the meaning of a certain Act of Parliament, entitled (here set out the title of this Act), which said sum of money the defendant hath not paid, and such or the like form of declaration shall be deemed to be sufficient, without stating any other matter whatsoever, provided that no such action shall be maintainable when the amount due is under twenty pounds"

Sec 122 "And be it enacted that it shall be lawful for the Council, and they are hereby required to apply the moneys which may be received by them from any persons by this Act directed to contribute to the said establishment, and from any other source applicable thereto, in payment, as far as the same will extend, of the costs, charges and expenses to be incurred from time to time in the maintenance and establishment of the Fire Police"

The Manchester Town Hall and Improvement Act, 1866 (29 Vic, Cap 29) makes the following proviso —

"In every case of fire occurring in the City after the passing of this Act, the owners of property endangered thereby shall be liable to pay and contribute the actual expenses incurred by the Corporation in relation thereto, and also a reasonable charge for the expenses incurred by the Corporation in the establishment and maintenance of the Fire Brigade, and for the use of the engines, implements, and apparatus, and the attendance of the Fire Police, and also for the use of water for purposes of salvage, and such expenses and charge shall be paid to the City Treasurer by the respective owners in proportion to the value of such respective property to which assistance has been *bonâ-fide* given or extended by the Fire Brigade, provided that no owner shall be required to pay a larger sum than the value of his property, and if any difference shall arise between the said owners or any of them, on the one part, and the said City Treasurer on the other, as to whether any such demand ought to be paid, or as to the amount of any such demand, then any two Justices shall, on the application of the said City Treasurer, cause any such owner so disputing, as aforesaid, to appear before them on a reasonable summons or notice in that behalf, and shall, on hearing the parties and their witnesses, settle if any, and, if any, what amount ought to be paid to the said Treasurer by such party as aforesaid, and if it shall appear to such Justices that any such sum ought to be paid, that said Justices shall by their order direct such party, as aforesaid, to pay to the City Treasurer such sum to them so appearing to be due, together (if the said Justices shall think fit) with reasonable costs to be fixed by the said Justices, and the said party shall forthwith pay the same sum and costs to the said City Treasurer accordingly "

The *Salford* Corporation are given special powers under the Salford Improvement Act, 1862 (25 and 26 Vic , Cap. 105)

Sec 273 "Thè Corporation may permit their engines and the implements and apparatus belonging thereto, and any part of the Fire Police establishment, to proceed beyond the Borough for the extinguishing of fire happening to property in the neighbourhood, and the owner of such property shall in such case defray the actual expense that may be thereby incurred, and shall also pay to the Corporation a reasonable charge for the use of such engines, implements and apparatus, and for the attendance of such Fire Police; and in case of difference between the Corporation and such owner, the amount of the said expenses and charge, as well as the propriety of the said engines, implements and apparatus, and Fire Police having so proceeded as aforesaid for the extinguishing of such fire (if the propriety thereof be disputed), shall be summarily determined by any Justice, whose decision shall be final and conclusive on all parties, and the amount awarded by such Justice shall be recoverable in like manner as any penalty imposed by this Act is recoverable "

Sec 274 "And whereas it is expedient that all extraordinary expenses occasioned by any fire should be borne by and amongst all the respective insurance offices who have insured against fire property endangered, or to which assistance has been given or extended by such Fire Police Establishment, and by and amongst all the respective owners of uninsured property endangered, or to which such assistance as aforesaid has been given or extended, in fair and equal proportions be it enacted, that all such extraordinary expenses as aforesaid in the case of any fire shall be taken to be the wages of the Fire Police consequent upon the occasion, in addition to their ordinary allowance, and the payments for further assistance necessarily employed on such occasions, together with such sum as the Corporation shall think reasonable for the use and risk of their engines and utensils, and shall be paid to the Superintendent of the said Fire Police Establishment, by the respective insurance offices so having insured as aforesaid in proportion to the amount by them respectively insured on such property, and by the respective owners of uninsured property in proportion to the value of such respective property as aforesaid provided that no office shall in any case be liable to pay a larger sum than the amount by such office insured, or than the amount of the property upon which the insurance shall have been made by such office, nor shall any owner be liable to pay a larger sum than the amount of his property uninsured, and when any property is insured in two or more insurance offices such office shall only be liable in proportion to the respective amounts by such office insured "

Sec 275 " If any difference shall arise between the said respective offices and owners, or any of them, and the said Superintendent, as to whether any such demand ought to be paid, or as to the amount of any such demand, then any Justice shall, on application of the said Superintendent, issue his summons to any director or agent of any such Insurance Office, or any such owner so disputing as aforesaid, to appear before two Justices at a time to be named in such summons, and such Justices shall, on hearing the parties and their witnesses, settle whether any, and if any, what amount ought to be paid to the said Superintendent by such owner, director, or agent, as aforesaid, and if it shall appear to such Justices that any sum ought to be paid they shall by their order direct such owner, director, or agent, as aforesaid, to pay to the said Superintendent such sum to them so appearing to be due, together (if the said Justices think fit) with reasonable costs fixed by them, and such owner, director, or agent shall forthwith pay the same sum and costs to the said Superintendent accordingly "

Sec 276 " If any such property, as aforesaid, be insured in any Insurance Office in an amount less than the value of the property in hazard according to a reasonable estimate thereof for the purpose of insurance, such Insurance Office shall not be liable to pay or contribute towards the expenses aforesaid in respect of more than the proportion which the amount so insured may bear to the whole value of such property, according to such estimate as aforesaid, and the owner of any such property insured in any such office in an amount in the whole less than its value so estimated, as aforesaid, shall be liable to pay or contribute to the expenses aforesaid in respect to the residue of the amount of the value so estimated, as aforesaid, as an uninsured owner to that extent, and shall be taken to be an owner of uninsured property to the amount of such residue for all the purposes of this Act "

Sec. 277 " If in any proceedings before two Justices against any such Insurance Office, or agent, or director, it shall appear that it is the intention of any such office to dispute the validity of any such insurance, then such Justices may adjourn the proceedings from time to time for the purpose of postponing their decision until after any trial or other settlement of such dispute as aforesaid "

Sec 278 " In default of payment of the said sum and costs so ordered to be paid as aforesaid, such Justices shall issue their warrant to levy the same by distress and sale of the goods and chattels of the person on whom such order for payment shall have been made "

Sec 279 " Instead of proceeding for the recovery of any such demand by summons and proceedings thereon before Justices aforesaid the said Superintendent may recover the same against any such agent or any such director, or against any such owner, by action in any court of competent jurisdiction in the name of such Superintendent "

Sec 280 " All moneys which may be received by the Corporation from the directors of fire offices and from such other persons as aforesaid, and from any other source applicable thereto, shall be applied in payment, so far as the same will extend of the costs, charges and expenses to be incurred from time to time in the maintenance of the said Fire Police Establishment "

Sec 281 " Any constable, officer, or other person appointed by the Corporation, may enter, and, if necessary, may break into any building which may be or be reasonably supposed to be on fire, or any building or land adjoining or near to any such first-mentioned building, without the consent of the owner or occupier thereof respectively, and may do all such acts and things as he may deem necessary for extinguishing any fire, or for protecting such building or any goods or chattels therein from fire "

Special powers in the matter of fire protection are given to the City of *Edinburgh* under the Edinburgh Municipal and Police Act (42 and 43 Vic , Cap 132, Secs. 291 to 293)

Sec 291 "The Magistrates and Council shall provide and have at all times a sufficient establishment of fire engines, hose, and other appurtenances to be used for extinguishing fires, also fire escapes and other implements and requirements for safety or use in case of fire, and the firemaster shall appoint such number of firemen (to be called the Fire Brigade) as the Magistrates and Council shall think fit and expedient and the expenses of maintaining the fire establishment and Fire Brigade, in so far as not contributed to in the manner after provided, shall be defrayed from the burgh assessments "

Sec 292 "On the occasion of a fire, the firemaster or other officer in charge of the Fire Brigade may, in his discretion, take the command of any volunteer Fire Brigade, or other persons who voluntarily place their services at his disposal, and may remove, or order any fireman to remove, any persons who interfere by their presence with the operations of the Fire Brigade, and generally he may take any measures that appear expedient for the protection of life and property, with power by himself and his men to break into or through or take possession of or pull down any house or building for the purpose of putting an end to a fire, doing as little damage as possible, and he may also, on such occasions, cause the water to be shut off from the mains and pipes of any district, in order to give a greater supply and pressure of water in the district in which a fire has occurred."

Sec. 293 "The Magistrates and Council, or the Firemaster, under such regulations as the Magistrates and Council shall make, may, on the written requisition of some responsible persons permit such part of the Fire Brigade and fire establishment as they or he may think safe and expedient to be sent beyond the burgh for the purpose of extinguishing fires Provided always that the owners and occupiers of the property to which such part of the Fire Brigade and establishment shall be sent, shall be bound to defray the whole expense that may be incurred in the transit and use of such part of the Fire Brigade and establishment, and also such further sum not exceeding £50 per cent, upon the gross amount of such expense as may be deemed reasonable for the wear and tear of the engines and appurtenances, the amount of which expense shall be recoverable by the collector as a debt at common law, the owners or occupiers of the property where the fire may have occurred, and all other persons interested being always entitled to mutual relief against each other, according to law, for the sums so paid by them or any of them from whom the Magistrates and Council may recover or receive the same, and the Magistrates and Council shall have power to modify charges and percentage when they see cause for so doing."

The Police and Statute Labour of the City of *Glasgow* provides as follows --

Sec 166 "The proprietor and occupier of every land or heritage within the City in which a fire breaks out shall be jointly and severally liable to pay to the treasurer, as a contribution towards such expenses, the sum of fifteen pounds sterling, or whatever less sum is equal to one-half of the said expenses"

Sec 167 "The proprietor and occupier of every land or heritage beyond the city in which a fire breaks out, and to which an engine and firemen are sent, shall be jointly and severally liable to pay to the treasurer the whole of the expenses attending the fire, with the addition of such a sum not exceeding 25 per cent. on the whole of said expenses, as shall in the first instance be fixed by the Board, as a reasonable contribution in respect of the wear and tear of the engines with their appurtenances and of the ordinary expenses of supporting the establishment "

Sec 168 "The treasurer shall give notice in manner hereinafter provided to any proprietor or occupier of a land or heritage, either within or beyond the city, whom he intends to hold liable in payment of the said expenses, stating the particulars and the amount thereof, and requiring immediate payment, and if any such proprietor or occupier considers the amount claimed to be excessive, or disputes the propriety of sending engines and firemen to his land or heritage beyond the city, he may, within 10 days after such notice, appeal to the sheriff, and the sheriff shall thereupon decide such appeal, and may grant warrant for the recovery of any amount awarded by him, with expenses, in the same way as if such amount were due and in arrear as an assessment, or may allow expenses to the appellant, and grant warrant against the Board for the recovery thereof, but if such appeal is not made, the amount specified in the said notice shall be deemed to be due, and shall be recoverable as damages "

The special powers given to *Dublin* are under the Dublin Corporation Fire Brigades Act, 1862, in which Secs 9 to 11 are as follows —

Sec 9 "It shall be lawful for the Corporation, as occasion may require, to permit such engines, escapes, implements and apparatus, and every or any part of the Fire Brigade establishment, to proceed beyond the limits of the City or Borough for the purpose of extinguishing fire happening to property in the neighbourhood thereof, and the owners of such property shall in such case defray the actual expense that may be thereby incurred, and shall also pay to the Corporation a reasonable charge for the use of such escape or engines, implements and apparatus, and for the attendance of such Fire Brigade; and in the case of difference between the Corporation and the owners of such property, the amount of the expenses and charges, as well as the propriety of the said engines, escapes, implements, apparatus, and Fire Brigade having so proceeded as aforesaid for the purpose of extinguishing such fire (if the propriety thereof be disputed), shall be summarily determined by any divisional Justice, whose decision shall be final and conclusive on all parties, and the amount of the said expenses in dispute may be fixed by such Justice, and may be recovered in like manner as any penalty imposed by the recited Act is or may be recoverable, and the amount of all such expenses and charges paid or recovered shall be applied in payment or in aid of the costs of maintaining such Fire Brigade establishment "

Sec 10 "The owner and occupier of any house, building, or premises, ship, goods, or other property within the limits of the City or Borough in which a fire breaks out shall be jointly and severally liable to pay, and shall pay to the Corporation, as a contribution towards the expenses incurred or to be incurred in extinguishing such fire, the sum of fifteen pounds sterling, or whatever lesser sum is equal to one-half of the said expenses, and the amount of such contribution or proportion of expenses shall in case of difference be determined, and be recoverable and applied in manner provided by the immediate preceding section of this Act with respect to the expense of extinguishing fires beyond the limits of the City or Borough "

Sec 11 "The Corporation may receive any sum or sums of money either by way of donation or annual subscription, which insurance, or other companies, societies, or individuals may agree to allocate or contribute towards the expenses of the establishment and maintenance of the Fire Brigade, engines, implements, and appliances, requisite for the prevention and suppression of fire, and the protection of life and property; and the Corporation may, if they think fit, purchase and acquire from any such Company or Society now existing in Dublin any fire escapes or other implements or machinery they may be possessed of for the extinction of fire or the protection of life and property from fire for such consideration as may be mutually agreed on "

Secs 213 to 215 of the 1845 Act for the Improvement of the Borough of *Belfast* are as follow —

Sec 213 "And be it enacted, that it shall be lawful for the Council to permit such engines, implements, and apparatus, and any part of the Fire Police establishment, to proceed beyond the limits of this Act for the extinguishing of fire happening to property in the neighbourhood thereof, and the owner of such property shall in such case defray the actual expense that may be thereby incurred, and shall also pay to the Council a reasonable charge for the use of such engines, implements, and apparatus, and for any loss or damage which they may sustain, and for the attendance of such Fire Police, and in case of difference between the Council and owners of the said property, the amount of the said expenses and charges, and the propriety of the said engines, implements and apparatus and Fire Police so proceeding as aforesaid for the extinguishing of such fire (if the propriety thereof be disputed), shall be summarily determined by two Justices, whose decision shall be final and conclusive on all parties, and the amount of the said expenses and charges in case of dispute may be fixed by the Justices, and shall be recoverable in a like manner as any penalties under this Act may be recovered "

Sec 214 " And whereas in the case of a fire, certain extraordinary expenses are incurred, that is to say, in the wages of the Fire Police, consequent upon the occasion, in addition to their ordinary allowance, and in the pay of further assistants necessarily employed on such occasions, and in the wear and tear of engines and utensils, and by damage and injury sustained at such fires, and whereas the directors of various Fire Offices have voluntarily contributed to such extraordinary expenses; but other fire offices, although interested in the preservation of property in Belfast endangered by fires, have not, nor have the proprietors of property uninsured and so endangered, joined in contributing towards such extraordinary expenses; and whereas in the case of a fire happening, it is expedient that all such extraordinary expenses as aforesaid shall be borne expressly for and amongst the persons interested in the preservation of property to which assistance has been *bonâ-fide* given or extended by such police in case of such fire, that is to say, such extraordinary expenses as aforesaid should be borne equally by and amongst all the respective Insurance Offices who have insured against fire property to which assistance has been *bonâ-fide* given or extended as aforesaid by such police establishment against such fire, and by and amongst all the respective owners or proprietors of uninsured property, to which property such assistance as aforesaid has been *bonâ-fide* given and extended by the said police establishment against such fire, as aforesaid in fair and equal proportions, be it, therefore, enacted, that all such extraordinary expenses as aforesaid in case of any fire, shall be paid to the treasurer of the borough by the said respective Insurance Offices so having insured as aforesaid, in proportion to the amount by them respectively insured on such property, and by the respective proprietors of uninsured property, in proportion to the value of such respective property as aforesaid, provided that no such office shall in any case be liable to pay a larger sum than the amount by such office insured, or than the amount of the property upon which the insurance shall have been made by such office, nor shall any proprietor be liable to pay a larger sum than the amount of his property uninsured, and that when any property is insured at two or more Insurance Offices, each such office shall only be liable in proportion to the respective amounts by such office insured; and if any difference shall arise between the said respective offices and proprietors or any of them, on the one part, and the Council of the Borough on the other, as to whether any such demand ought to be paid, or as to the amount of any such demand, then any two Justices shall, on the application of the Council, cause any director, or resident agent of any such Insurance Office to appear before them on summons or notice in behalf, and shall, on hearing the parties, settle whether any and (if any) what amount ought to be paid to the said treasurer by such party as aforesaid, and if it shall appear to such Justices that any such sum ought to be paid, the said Justices shall, by their order, direct such party as aforesaid to pav to the said treasurer such sum to them so appearing to be due, together (if the said Justices shall think fit) with reasonable costs to be fixed by the said Justices, and the said party shall forthwith pay the same sum and costs to the treasurer accordingly "

Sec 215 "And be it enacted, that if any such property as aforesaid be insured in any Insurance Office in an amount materially less than the value of the property in hazard according to an estimate thereof for the purpose of insurance, such Insurance Office shall not be liable to pay or contribute towards the expenses aforesaid in respect of more than the proportion which the amount so insured may be to the whole value of such property according to such estimate as aforesaid, and the owner of any such property insured in any such office or offices, in an amount in the whole or less than its value so estimated as aforesaid shall be liable to pay or contribute towards the expenses as aforesaid in respect of the amount of the residue of the amount of the value so estimated as aforesaid, as an uninsured proprietor to that extent, and shall be taken to be an owner of uninsured property to the amount of such residue for the purposes of the Act "

All but a few fire brigades in this country make a charge for their attendance, but the amounts asked for in payment for similar services vary considerably. The particulars of the following charges shew that there is a very great variety of practice in different towns .—

Alton (Hants) —There is no charge for use of engines within the borough boundaries Use of steam fire engine out of town, £5 5s , use of manual fire engine out of town, £3 3s , members of brigade each, per hour, 1s , and assistants 6d per hour each If the engines are not used half the charge is made, and double if the distance to the fire is more than eight miles

Barrow-in-Furness —The fire appliances are the property of the Corporation and are kept by them No charge is made for the use of the apparatus at fires, but labour and horse hire are charged, 2s 6d each fireman for the first hour, 1s per hour till 12 hours, after 12 hours, 1s 6d per hour, for watching salvage, 9d per hour, horse hire, for every turn out, £1 1s for two horses, if called outside the borough, for use of steam fire engine, £2, manual, £1

Bristol —This brigade is a department of the police force. No charge is made for attending fires within the City bounds, and the Brigade does not now go outside the City to attend fires

Cardiff —Steam engine, 1st hour, £2 2s , and £1 1s each succeeding hour, manual engine, 1st hour, £1 1s , and 10s 6d each succeeding hour, horse hire, £2 2s per pair, Superintendent or other officers, 5s for 1st hour, and 2s 6d for each succeeding hour, firemen, per hour, 1s After the first hour, a reduction is made in the charge per hour for the steamer according to the extent and duration of the fire This is a police brigade, under the Corporation There is no charge made within the City

Coventry —The charges made by this Brigade for attendance at fires outside the City are as follows —For the services of the staff Captain, first hour 10s , and 3s 6d. per hour afterwards, officers, 5s for first hour and 2s. 6d per hour afterwards, firemen, first hour 3s , and 1s 6d per hour afterwards The time is calculated from the time when the Brigade leave the station until the return of the engine or other appliances used, except in the case of men left to watch, whose time is calculated until their return For the use of the engine, if the fire is within five miles of the station, £3 is charged, and for every additional mile £1 , for conveyance, the charge is 15s per horse and 2s 6d per driver when the distance is under 2 miles, £1 per horse and 4s per driver when the distance is between 2 and 4 miles, and for every mile over 4, with four horses £1 and 1s per mile for each driver All other actual expenses incurred and damage to engine, hose, or other appliances are also charged There is no charge made for the use of the engine inside the City

Croydon —Outside the borough the charges for attendance at fires are —Steamer, first hour £2 10s , per hour after £1 5s , if not used, £1 : manual engine, first hour £1 10s , per hour after £1, if not used 10s , hose tender, first hour £1, per hour after 10s , if not used 10s , horses, first hour £1 1s , per hour after 10s , called and not required £1 1s , Chief Officer, first hour 7s 6d , per hour after 5s , superintendents, first hour 5s , per hour after 3s , firemen, first hour 2s 6d , per hour after 2s , assistants, first hour 2s 6d , per hour after 1s , for cleaning machinery after a fire, steamer £1, manual 10s , hose tender 10s , refreshments, and damage to engines, hose, and other apparatus are extras, when the Brigade is called and is not required the officers and men receive one hour's pay, which is charged, the time charges commence from the time the men leave station until their return, and all parts of hours are charged as hours No charge is made for attendance at fires inside the borough either for use and wear of the plant, or the services of the staff

Hastings and St Leonards —The following scale of charges is in force —For fires within the Borough there is no charge for the use of engines, but charges are made for the services of the men and the cleaning of the plant Captain, £1 1s , lieutenants, 10s 6d. each; foremen, 1s 6d per hour; firemen, 1s per hour;

pumpers or helpers, 6d per hour; watching, per man per hour 7d.; for cleaning, steamer 10s, manual 5s., hose reel 2s 6d, hose 1s per length; horse hire and refreshments, nett cost, damage to plant extra For attendance at fires outside the Borough the scale is higher For the use of engines, including cleaning, steamer £5 5s, manual £2 2s, hose reel 10s 6d, for cleaning hose, 1s per length For the services of officers and men Captain, £2 2s, lieutenants, £1 1s each, foremen, 1s 6d per hour; firemen, 1s per hour, pumpers, 6d per hour, watching, per man per hour, 7d, horse hire and refreshments, net cost, damage to plant extra

Hereford—A new scale of charges was agreed to at a recent meeting of the County Council Chief Officer Frank Richardson writes —"I should like to say that the scale of charges has been revised in consequence of the difficulties often experienced in determining the four mile radius, and to simplify matters, the mileage charge on the old scale has been entirely done away with and a specific scale of charges adopted for services within the City boundary, and a similar scale for services rendered outside the City boundary" Inside the City the scale is —Use of engines, nil, superintendent, 10s 6d, deputy superintendent, 7s 6d, engineer, 5s; brigade men, 5s, police constables, 2s 6d, horses, irrespective of distance, 10s 6d, post boys, 2s 6d Outside the City the scale is higher —Use of engines Steamer, £7 10s, large manual, £4 4s, City engine, £3 3s, superintendent, £1 1s, deputy superintendent, 10s 6d, engineer, 10s, brigade men, 7s 6d; police constables, 5s; horses, irrespective of distance, £2 2s, post boys, 5s If the Brigade is summoned but not required, half the above sums are charged If engaged more than eight hours upon any one occasion, every officer and man is further paid for the time he may be so engaged in proportion to the above charges Loss of articles belonging to the engine and Brigade, or any damage which may happen to such articles at the fire, is charged for The charges inserted in the accounts sent in to the owner, for attendance at fires outside the City boundary, only include the hire of the engines, pay of the Brigade, and hire of horses and post boys, all other payments are expected to be paid by the persons sending for the engines

High Wycombe—The charges authorised by the Urban Sanitary Authority for attending fires —Fire call, 10s , steam fire engine, for the first hour, £5 5s , for each succeeding hour, 10s , manual fire engine, £3 3s ; horses as arranged with contractor, pumpers and assistants according to time employed, refreshments as necessary, damage to appliances and accoutrements as estimated Within the Borough no charge is made for the use of fire engines

Liverpool — The following scale is in force at Liverpool —Inside the City Steam fire engine, £2 for turn out, £6 for first hour or part of hour, £4 per hour after, tender, £1, first aid machine (horsed or self-propelled), £1 for turn out, £3 for first hour or part of hour, £2 per hour after, electric light engine, £2 for turn out, £1 per hour or part of hour, reel (combination), £1 for turn out, £1 10s for first hour or part of hour, £1 per hour after, reel (ordinary), 10s for turn out, £1 10s for first hour or part of hour, £1 per hour after, ladders, 10s , fire escapes (horsed or self-propelled), £2, ordinary fire escape, £1 Outside the City Steam fire engine, for turn out, £4, and £2 per mile from station to fire, £8 for first hour or part of hour, £6 per hour after, hose carriage, £2, and £1 per mile from station to fire, £4 for first hour or part of hour, and £3 per hour after, tender, £2, and £1 per mile from station to fire, reel, £1 for turn out, £2 for first hour or part of hour, £1 10s per hour after, fire escape, £2, firemen working salvage, 1s 2d per hour, or 7s 6d per day of eight hours

Loughborough —Thirty-five neighbouring parishes pay an annual retaining fee to this brigade for the free use of the steamer The scale of charges for men and horses is.

—Superintendent, first hour 5s, each subsequent hour 2s; foreman, first hour 2s 6d, each subsequent hour 1s 3d; engineers, first hour 2s 3d, each subsequent hour 1s. 3d, firemen, first hour 2s, each subsequent hour 1s, horses £1 1s each, and coachman 10s 6d

Lydd—No charge is made for attendance at fires within the Borough Outside the Borough £2 2s is charged for the use of the engine, with the usual charges for helpers and pumpers

Manchester—The charges are—5s per man per hour, including the use of apparatus, and 10s for each horse engaged in conveying the machines to a fire The Fire Offices Committee pay a sum of £2,000 per annum, thus discharging all claims for services rendered to property insured with them

Reading—The charges of the Reading Brigade are—For use of engines in the Borough, nil Outside the Borough Steamers, £2 2s for first hour, 10s per hour after, horses, per pair, £2 2s, driver, 5s, Chief Officer, 5s for first hour, 2s 6d per hour after, engineers, 3s for first hour, 1s 6d per hour after, firemen, 2s for first hour, 1s per hour after

Saffron Walden—The charges are as follows—Out of town Use of engine, £3 3s, besides the hire of horses, pumpers, for the first hour 9d, and 6d for every succeeding hour, besides refreshments No charge is made for the use of appliances or water in the town

Southampton—The accounts are made out by the Superintendent and certified by Clerk of Accounts, Chairman of Fire Brigade Committee, and Chairman of Finance Committee The charges made for the use of appliances outside the Borough are Working at fire, steam fire engine, first two hours or portion thereof, £4, and £1 1s per hour after, attending and not working £1 1s, motor chemical engine £3 3s, and 2s 6d per mile, manual fire engine, first hour £1 1s, per hour after 10s, attending and not working £1 1s;

horse hose (subject to contract), 1s. 6d. per horse per mile, and 2s. per horse per hour waiting; attendance of superintendent, £1 1s The wages of the other officers and men are charged whether the fire is inside or outside the Borough according to the following scale —Deputy superintendents, 2s. 6d., in addition to wages as firemen, firemen, if in attendance at the Fire Brigade Station before the engine leaves, first hour 3s 6d, and per hour afterwards 1s; if not so present at station, but present at the fire within half-an-hour from the messenger being despatched from engine-house, first hour 2s 6d, per hour afterwards 1s; if not present as above, per hour only during time engaged, 1s, assistants, first hour 1s, per hour afterwards 6d; giving alarm of fire at station, within borough, 2s, giving alarm of fire at station, without borough, 5s, call boys, each 2s 6d, cleaning engine and hose, 4s per day, firemen in charge of salvage, per day or night, 5s

Stafford —Charge for engines within the Borough, nil; outside the Borough, steamer 10s 6d per hour, with a minimum charge of £1 1s and a maximum of £5 5s per day of twelve hours, manual engine (accompanying steamer, per day of twelve hours), £2 2s if used, 10s 6d if not used The charge for officers and men for attendance at fires is the same, whether within or without the Borough Chief Officer, 8s for first three hours or portion thereof, 2s 6d per hour after, other officers, 6s 6d for first three hours or portion thereof, and 2s per hour after, sergeants and engineer, 5s for first three hours or portion thereof, and 1s 3d per hour after, firemen, 3s 6d for first three hours or portion thereof, and 1s per hour after For cleaning the machinery the men are paid 25s for steamer, 10s for manual, 1s 6d per length of hose, 1s 6d for a stand-pipe, 2s 6d for hose cart and escapes In addition to the foregoing charges, a charge for reasonable refreshments is made, and in all cases of damage to engines, or appliances, firemen's uniforms and boots, compensation is charged.

Stockton-on-Tees.—Out of Borough.—Tender: Working at fire, first hour or portion thereof, £1 1s., each succeeding hour or portion thereof, 10s.; attending fire and not working, £1 1s. Horse hire for engines: One pair of horses and driver, £3 5s , two pairs of horses and drivers, £6 10s ; three pairs of horses and drivers, £9 15s Within the Borough the horse hire is less, the charges being £1 6s , £2 12s and £3 18s respectively (These charges for horse hire free the brigade from all liability in case of accident to any of the horses) Wages for attending Fires Captain (attending fire out of Borough only), £1 1s ; deputy captain 3s for first two hours or portion thereof, per hour after 2s , engineer 2s 9d for first two hours or portion thereof, per hour after 1s 9d , chief fireman, sub-engineer and turncock, first two hours or portion thereof, per hour, 2s 6d , each succeeding hour or portion thereof, per hour, 1s 6d , auxiliary firemen, first two hours or portion thereof, per hour, 2s 6d , each succeeding hour or portion thereof, per hour, 1s 6d , call boys, first hour or portion thereof, per hour, 1s , each succeeding hour or portion thereof, per hour, 6d As a Salvage Corps, or for cleaning appliances firemen, per hour or portion thereof, 10d , call boys, 4d Remarks. In all cases of special damage to engines or appliances, firemen's uniform and boots, compensation must be made Reasonable refreshments will also be charged in addition to the above

Sutton—Charge for use of appliances, nil The Officers and men are paid according to the following scale.—Chief officer, £1 1s , and 2nd officer 10s 6d for attendance at a fire In case the 1st and 2nd officers do not attend, the officer or member acting in his stead receives 10s. 6d , these payments being made if and when received from the Insurance Office. Firemen on duty at a fire receive 2s for the first hour and 1s per hour after. Refreshment money 3d per hour. Call boys 2s 6d , and turncock 5s. Every member told off, or standing by, at fires, after the engine has ceased working, is paid at the rate of 5s per day and 7s 6d per night, coachmen reckoning as firemen.

National Fire Brigades Union —The Council of the National Fire Brigades Union recommend the following scale of charges as a *maximum* for attendance of Fire Brigades at fires or calls to fires —For each officer, 5s for first hour, and 2s 6d per hour after, for each fireman, 3s for first hour and 1s 6d per hour after, for each pumper, 1s for first hour and 6d per hour after; for horse hire, cleaning, refreshments, and other out-of-pocket expenses, the amount paid; for serious damage to apparatus, the actual cost, for the use of engines and their appurtenances, such sum as the Local Authority may require—the Council consider £5 5s for a steamer and £3 3s for a manual a fair charge

From the foregoing particulars of actual practice, it will be observed that there are two principal ways in which the charges can be rendered First, a fixed charge for the use of the engines and for each man employed, second, a charge for the engines and men regulated by the time actually occupied in performing the work Whichever of these methods is more satisfactory to the brigade and the sufferer from fire must be pronounced to be the best

Objection has been taken to the "time employed" system on account of the temptation to prolong attendance beyond the time really necessary, and it would seem difficult to answer this as a question of theory, it being clear that all arrangements in connection with fires should tend to promote the performance of the work with all possible despatch But I believe very little practical inconvenience has at any time been caused by this system of charging

In most towns it will be noticed that no charge is made for the use of engines, in some of these, however, damage to machinery, if any, is charged for. It is a question if sufferers can be justly called upon to pay for engines and hose, which are the firemen's tools that enable them to do their work. But, as in many towns the amount charged for labour is ultimately received by the firemen, and that for engines by the local authorities who own them and keep them in repair, it is difficult to see how, in these instances at least, it can be avoided

Nearly all brigades make a distinction between fires within and without the City or Borough boundaries When the engine is the property of the local authorities a charge for its use for the benefit of those who contribute to the rates cannot be enforced, and in a few towns the amount per hour for services rendered to them is less Volunteer brigades frequently allow the free use of their engine to subscribers, and in some cases do not make any charge whatever for attendance at a subscriber's house

In most accounts an item for refreshments is included, and if reasonable in amount it is seldom objected to

A new Volunteer Brigade desiring to draw up a scale of charges cannot do better than adopt that recommended by the National Fire Brigades Union It is a very fair one, and may be said to represent an average of the widely differing scales at present in force in this country

CHAPTER VI.

RECORDS, REPORTS, AND ACCIDENT INSURANCE

RECORDS OF FIRES—PARTICULARS USUALLY GIVEN—MODEL TABLES FOR RECORDING ORIGIN OF FIRES—MODEL TABULAR RECORD OF EACH FIRE—ACCIDENT ASSURANCE—HUDDERSFIELD AND HOLMFIRTH, LANCASHIRE, AND WEST YORKSHIRE FRIENDLY SOCIETIES, ASSOCIATION OF PROFESSIONAL FIRE BRIGADE OFFICERS — NATIONAL FIRE BRIGADES UNION WIDOWS AND ORPHANS FUND

AMONGST the smaller matters in connection with Fire Brigade work which deserve consideration may be mentioned the proper keeping of records, and the compilation of annual reports In keeping the books of the brigade, as full information as possible should always be given concerning every fire In particular, it is desirable to mention the cause of the outbreak, which will naturally be ascertained whenever possible, the value of the property destroyed, the estimated value of risk, the time of discovery, the business carried on in the building, and how the fire was extinguished The annual report, in so far as it relates to the details of the brigade's work, will be compiled from the particulars given in those records, and should always be made year by year upon one plan, so that comparison of the results of one year's work with others can always be made easily As a rule, it will be found useful to have a separate Table, giving the origin of each fire; these particulars are very important, bearing as they do so heavily upon the question of fire prevention.

The following Table, which has been drawn up so as to classify every fire under a moderate number of heads, will be found useful

MODEL TABLE FOR RECORDING THE ORIGIN OF FIRES.

UNAVOIDABLE ACCIDENT—

Accidents with fires and lights, distinguishing in separate item any origin common to a number of fires

Friction of machinery, not due to improper fixing

Spontaneous ignition from unavoidable causes

All other fires under this heading (distinguishing an origin which may be common to a number of fires i any one year)

CARELESSNESS—

With lights, distinguishing electric light, gas lamps, candles, lucifers

Spontaneous ignition caused by want of cleanliness improper disposition of goods, or want of prope ventilation

Children playing with fire

Friction of machinery, etc (caused by imprope fixing)

All other fires under this heading (distinguishing a origins which may be common to a number of fires i any one year)

DEFECTIVE CONSTRUCTION—

Timber too near fires and fireplaces

Of flues and fireplaces.

Of roofs.

Of buildings, other than as mentioned above

Of gasfittings.

Of any other

Wilful (Incendiarism)—

To defraud insurance companies
To defraud creditors
To hide robbery
To hide murder
Through spite, malice, or temper
Through civil commotion
For reward
Through any other causes

Intoxication—

Doubtful—

Not Ascertained—

When the annual report is not printed in pamphlet form for subscribers, it should be sent to the local journals, the editors of which will always gladly insert it

The Record of each separate fire should be kept in a regular form, with the following headings —

Time of Call
Time Arrived
Time Reached Station on Return
Place
Occupier of Premises
Business carried on
Name and Residence of Landlord
Cause or Supposed Cause of Fire
Whether Insured, Building.
,, ,, Contents
For How Much Insured, Building
For How Much Insured, Contents
Call
Lives Lost, if any
How Extinguished
Water Supply
Number of Engines attending belonging to Brigade
Number of Officers and Men
Engines belonging to other Brigades
Number of Assistants and Time Employed.
Estimated Damage.

Another matter which should have careful attention is the insurance of the brigade against death and sickness. I have made some observations in Chapter III. as to the insurance of risks under the different Acts of Parliament affecting Workmen's Compensation, but in addition to these risks there are those of sickness and death from disease, and of injury, not caused in the course of a fireman's work, or arising out of it

There are four Friendly Societies formed amongst firemen, the Lancashire, West Yorkshire, and the Huddersfield District, and in connection with the Association of Professional Fire Brigade Officers The first three furnish certain benefits at both sickness or death, and the last at accidental death only Subjoined are a few details relating to each of the Societies named

The *Huddersfield District Fire Brigade Friendly Society* was founded in the year 1869, and has funds in hand amounting to about £1,514 The subscriptions are 2s 6d at entrance and a quarterly payment of 1s to the relief fund, and 2d to the management fund, together with an extra 1d for members' card The benefits during sickness are 15s per week for 12 weeks, so long as the member is unable to attend his usual employment, if caused by accident, after that time the case is left in the hands of the committee to be dealt with at their discretion £75 is paid at death, if caused at fire or practice, if it occurs within twelve months of such injury £40 is paid if a member is partially incapacitated, through an accident at a fire, practice, or false alarm £20 is paid if a member is partially incapacitated in similar circumstances £10 is paid if death arises from natural causes The members on the roll number about 100 In accordance with the regulations of this Society, when a member resigns his duties in a brigade, he ceases to be a member of the Society, but is entitled to draw two-thirds of his subscription to the relief fund. To obviate individual cases of hardship which might occur, a salvage corps has been formed, to which, under certain restrictions, members may be elected instead of resigning their connection with the

Society The President is Mr Thomas Brooke, J.P, Mr. John Morton, Chief Constable of Huddersfield, is Treasurer, and Mr George W Haigh, 14, Victoria Street, Moldgreen, Huddersfield, is Secretary

The *Lancashire Fire Brigade Friendly Society* was founded on August 26th, 1876, on which date the first general meeting was held From information furnished by Mr. Joseph Watson, the honorary secretary from the foundation, to whose exertions the Society is much indebted, I learn that at the end of 1910 the funds in hand amounted to £11,312 2s 8d There are 2,488 members The rates of subscription are 1s entrance fee, and 1s 2d quarterly The benefits during sickness or disablement are 14s per week during a period not exceeding 26 weeks, after which the case receives the special consideration of the Committee £50 are paid to the heirs or executors at the death of a member if he is killed on duty, and £10 if he dies from natural causes According to rules, when a member vacates his position in a brigade, he is compelled to leave the Society, and is refunded two-thirds of his individual subscription Since the beginning, notwithstanding the fact that owing to so many changes in the Brigades, a great number of members have been compelled to resign, an increase has been made every quarter Last year 216 members left, and there were 24 deaths, but against this the Society enrolled 272 new members During the last six years the average increase in membership has been 77 per annum The rules have been discreetly drawn up, and are well adapted for requirements of firemen The committee of management consists of a president, vice-presidents, treasurer, secretary, and one member from each brigade connected with the Society The officials are elected annually Nothing has been paid for services rendered the Society at any time, the whole of the offices being strictly honorary. The treasurer is Captain James Boyle, of Blackburn Fire Brigade, and the hon secretary, Lieutenant Watson, 6, Richmond Terrace, Blackburn, both of whom were appointed on the founding of the Society 35 years ago. This Society, which accepted members from brigades in all parts of the country, has recently been compelled to decline new members from outside Lancashire, owing to the large number of applications from the Midlands and the Southern Counties

The *Yorkshire Fire Brigade Friendly Society* was founded 40 years ago, and has a membership of 1,239 Total funds in hand, £6,445 16s 1d The subscriptions are 1s for entrance fee, and 1s paid quarterly for ordinary funds, and 2d per quarter to defray the expenses of management. The benefits derived consist of the following —(1) In the case of accident 15s per week for twelve weeks are granted if the case require such relief' Should the member be unable to follow his employment at the end of that time the case is left in the hands of the committee (2) £100 is paid in case of death caused by accident when on duty, and £8, £10, and £12, according to the age of the member on entering the Society, is given when death is from natural causes Members of this Society must be attached to a Fire Brigade, Escape, or Salvage Corps Mr T Ellis, Cleckheaton, Yorks, is Secretary Members of 25 years' standing are exempt from contributions other than fines

The *Association of Professional Fire Brigade Officers* was founded in 1902, and insures all its members and associates against Fatal Accident arising out of their employment in a sum of £100 each The premium of 1s 6d per annum is borne by the Association, and no levy is made in respect of it The subscription of an Associate is 2s 6d per annum, and of this sum 1s 6d is expended by the Association for the above purpose The amount of funds in hand at the close of the last financial year was £210, and the members numbered 353, eighty of whom are Chief Officers. The rules do not provide for any benefit in case of sickness, but any special case of need is considered. A Widows' and Orphans' Fund has been formed in connection with this Association, the object being to relieve any widow, child, or children of a deceased member, honorary member, or associate of the Association. It should be mentioned that the honorary members mentioned are retired active members of the Association Mr P J Hackett, 10, Harrington Chambers, Liverpool, is Secretary of the Association

There is also a Widows', Orphans' and Benevolent Fund in connection with the *National Fire Brigades Union* The rules enact that "every widow and orphan whose husband or father shall, at the time of his death or last illness, be an active member of a properly constituted fire brigade, whether volunteer, paid, part paid, or private, shall be eligible for election to an annuity, and every member of such a brigade over 60 years of age shall be eligible for a pension" Subscriptions are voluntary, and 10s per annum carries a vote Brigades or individuals contributing £1 1s per annum may nominate a person to vote on their behalf at the above rate The capital account of the Fund now stands at upwards of £7,000

CHAPTER VII

FIRE BRIGADE STATIONS.

INTRODUCTORY REMARKS TO CHAPTERS UPON FIRE BRIGADE EQUIPMENT—THE BEST APPLIANCES ARE THE CHEAPEST—FIRE BRIGADE STATIONS IN VILLAGES—VALUE OF A THOROUGHLY GOOD STATION IN TOWNS—POSITION—ARCHITECTURE—ARRANGEMENT AND DETAILS OF ENGINE-ROOM, WATCH-ROOM, ETC.—FLOORS—DOORS—STABLES—TOWER—HEATING APPARATUS—LIVING AND BED-ROOMS—ROOFS, ELECTRIC APPLIANCES—GAS, ETC.—COMPLETE SKETCH OF FIRE STATION BY THE LATE FIRE MASTER OF EDINBURGH—C. O. A. R. TOZER'S OPINION—THE BROMLEY FIRE STATION—QUICK HITCHING ARRANGEMENTS—DECORATION OF FIRE STATIONS.

HAVING dealt in the preceding chapters with the more prominent considerations affecting the establishment and organisation of Fire Brgades, I come next to those relating to their equipment. In this and the three following chapters my remarks will apply more to Fire Brigades of every kind than they have hitherto done. The apparatus adopted must necessarily be regulated more by the size of the town, and the buildings it contains, than by the kind of Fire Brigade by which the town is protected.

Generally, in regard to the equipment of a brigade, it may be observed that it is always well to bear in mind, when deciding what appliances are to be provided, that the best apparatus is certain to be, in the long run, the cheapest. There is no machinery of any kind which is required to stand such hard and irregular work as a fire engine and its hose and tools. These appliances must have many good qualities; they must not deteriorate if left for a long time without much use; they must be capable of being brought into action at a moment's notice, and often they must stand the strain of unusual wear and tear, which work at a fire is certain to occasion. And it must not be forgotten that very much depends upon the quality of the apparatus, because, if engine or hose fail, the loss of property from this cause may be out of all proportion to the small amount that can be saved by the purchase of apparatus at the lowest rate

The purchase of cheap fire apparatus is the worst possible economy that could be exercised, because, in obtaining bad appliances of this sort, one gets the most costly rubbish upon which money can be thrown away

These remarks apply to the engines, and every portion of the apparatus used at fires

The first matter which demands attention when a brigade has been established, and arrangements are to be made for getting it into working order, is the provision of a suitable home for it In small towns, large and elaborate buildings are, of course, out of the question A simple shed, with sufficient room to house the engine, hose, and uniform, reasonably light and dry, must be made to serve Even in this, however, it is important that there should be some means of providing artificial warmth for the purpose of drying the hose, and of keeping the engine free from frost in cold weather There is little expense attached to this, but in small engine houses heating is frequently neglected A key should be in the hands of every member of the brigade, and in those of some trustworthy person living near the station

In larger towns, where the local authorities can be induced to supply funds from the rates, or the inhabitants will furnish adequate means, the money spent upon a thoroughly good station will not be thrown away. The provision of a comfortable and convenient station will have the best possible effect upon the interest the firemen will take in their work, and consequently upon their efficiency. The opinions of several prominent firemen have been collected as to the arrangements which are found most suitable in such a building, their substance is presented in the views here expressed

The position of a station, in a town in which there is only one, should be central; if possible, on an elevation, and in a street from which there are wide roads to all parts A central position will naturally be near the chief business premises, and will enable an engine to be taken to all parts in the shortest time A good, easy gradient and a wide road are invaluable aids in turning out quickly The building may, with advantage, be kept back from the roadway, and the space between paved with stones, so that engines, etc, may be washed down outside without interfering with foot traffic on the paths

The class and style of architecture will be influenced by the shape and size of the ground and the building, the amount of money to be expended, and the locality, it is, therefore, hardly worth while examining this part of the subject closely

The size of the main room for the engine and appliances will depend upon the quantity of apparatus to be used There should be sufficient frontage in every instance to enable each engine and reel to stand side by side, so that any piece of apparatus may be run out without the necessity of first moving the others, and there should be depth enough to enable an engine to stand with its pole shipped, ready for horses to be attached as it stands in position. The height to ceiling should not be less than ten feet six inches, and, as a rule, the frontage can seldom advantageously be less than thirty feet The floor of the engine-room may be of solid wood blocks, and should be gently sloped so that the engine will move slowly of its own accord when the horses are ready to start, instead of their having to plunge and tug at the traces in order to move a heavy dead weight. This should be done even in the smallest stations. Sometimes tram-rails are preferred to the sloping of the engine floor

Beside the engine-room, the watch-room and workshops, where these are provided, may advantageously be placed upon the ground floor The watch-room will be next the engine-house, with a full view of the latter, so that the man on duty can see all the machinery It will be either at the back or at the end of the main room opposite the tower, where it is important to economise frontage the former plan will be preferred This room can be used as a reading and committee-room for the brigade, and the lavatory, &c, will be in connection with it A workshop, in which there is a bench for a vice, a sink with water laid on, etc, is a great acquisition even in a small station

The doors of the engine-house may be either folding or swinging, and should be provided with simple automatic fastenings The walls may be lined with coloured glazed tiles if funds permit

The stables may be immediately at the rear of the engine-house, with open yard between, and the stalls built so that the horses' heads are towards the engines, there is then no necessity to turn the horses round in the stall before taking them out, this can be arranged by having a door for each horse, with its manger fitted on the inside, then, when the doors are opened, the horse has only to be moved forward toward the engine A verandah may be fitted in front of the stable, so that horses can be cleaned under it in wet weather, etc The harness in this case may be hung outside each door

A tower should always, where possible, form a part of the station, and will be the main architectural feature of the building, it should be, at least, high enough to take the fire escape, and wide and deep enough to enable the hose to be kept in it as well. Sometimes it is preferable to keep the fire escape outside. If a tower is impracticable, there must be a hose hoist with a protecting covering, and the necessary pulleys, etc., to enable each length to be hung, preferably by one end, but if not, by the middle. Means for artificial drying are also to be recommended. The apparatus for heating the steam fire engine boiler, where this is provided, can be made large enough to heat the hose drying chamber, or even the station itself, as well as the boiler. The tower, if there is one, may profitably be utilised for keeping a look-out, and should be arranged for this purpose. A speaking-tube or some other means of communicating with the man on duty in the watch-room is desirable.

The extent of the premises on the floor or floors above the rooms on the ground level will, of course, be decided by the number of men, if any, who are to live at the station. The coachman and a fireman in charge should reside on the premises in all moderately large towns, unless this is arranged, the efficiency of the brigade must, of necessity, be somewhat impaired. A staircase will lead from the engine-room to the living-rooms, and usually a sliding pole as well.

In regard to other features, it may be remarked that a part, at least, of the roof of the building might be flat, so that it could be used for a drying ground if necessary, but more especially for drill, which, in the case of brigades which do not often get a run out, is necessary to keep or make the men accustomed to the performance of their duties at great heights. It is unnecessary to say that great care should be taken to keep the engine-house perfectly free from damp, or that every chief fire station, at least, should be in direct communication with police-stations and telephone exchanges, as it is only when information is received quickly, that fires can be checked. Electric communication should be laid from the watch-room and fireman's bedroom to every fireman's house. This can be done on a circuit by means of relays, and does not require a separate wire to each house. I have made some further remarks upon this subject in the chapter on Fire Alarms Gymnastic appliances, horizontal bar, etc, would doubtless, in many stations, be attractive and useful, and I strongly recommend the formation of a library—at least every station, if it does not possess a lending library, should keep for reference a copy of the few books which have been written on fire subjects The whole of the gas fittings in the passages, engine-house, stables, yard, etc, should be controlled by a bye-pass to keep a small light all night, and the main gas-cock for these, and the lever to open back engine-house doors, stable doors, and passage doors, and to ring the whole of the bells at one time, should be so connected that one pull does the whole work There must be racks and pegs on the walls of the engine-house for the uniform and small fittings, those members who do not live at the station, however, usually find it better to take their uniform home, so that they may either go to the station, or direct to the fire, fully equipped for work

Mr Samuel B Wilkins, late Fire Master of Edinburgh, when the first edition of this book was published, was good enough to draw up a complete sketch of a modern fire station, which I append In a few particulars it was somewhat different from the opinion I have expressed, based upon the majority of opinions received from other practical firemen, but it is valuable in itself, and describes what would doubtless prove to be a convenient station

Mr. Wilkins observed —

"In dealing with the question I see there are many difficulties in the way of being able to lay down any definite plan for the construction of a fire station

"This arises through the various sites purchased for such a purpose in the numerous towns, as also the surroundings and restrictions as to height of buildings, cost of erection, and many other considerations now, as land in all towns is becoming more valuable, especially in the principal thoroughfares.

"I shall try, too, in giving my views, to combine economy with efficiency As to the sites, I should prefer the ground to extend further to the back and having less frontage and small back grounds My object in such preference is economy on the one hand, as back ground can be purchased much cheaper than a long frontage, and such back ground would, on the other hand, carry out my ideas in the interest of efficiency

"Front elevation Ground floor to consist of an office or watch-room for the firemen on duty, in which may be placed all the telegraphic instruments or telephones connected with the district stations, street fire alarms (if any), and all connections with private or public buildings, exchange, etc , having a door leading to the front street for receiving calls to fires, etc

"A side gate sufficiently wide to allow of the largest size engine or other apparatus passing through into or from the yard or court at the back

"Adjoining this gateway could be a door leading to the stair for officers' or firemen's quarters

"Another private door may be placed at the other side of the watch-room, which would be a private entrance to the superintendent's house, for which a side door could be placed in the lobby communicating with the watch-room or the superintendent's private office, which may be adjoining

"If the frontage is large enough to allow of sufficient accommodation for the superintendent's house, which could be extended over the gateway if the space is limited, his house would utilise the first floor -

"Should this floor not be sufficient for his accommodation, the inside staircase may be extended up to the next floor, or such other floors above, until the required accommodation is obtained, and should the superintendent require all the frontage provided, the stairs and door mentioned under the fourth heading, leading to the officers' or firemen's quarters would be abolished On the other hand, if the first floor is found sufficient for the accommodation of the superintendent, the stair and door mentioned above may remain, and the upper floors could be used for the assistant or other officers or firemen

"The courtyard may form a square which could be used for drill purposes, washing engines, etc

"On one side of this yard I place the engine-house, each engine standing in line with each other, having an entrance to each engine by gates or otherwise This engine-house would extend the required distance according to the number of appliances to be placed therein On the opposite side of this yard I place the stables, the gates of which would be directly facing the engine-house, the horses' stalls to be directly facing the engine they were to turn out for An entrance to the engine-house may be made from the firemen's watch-room, from which the doors facing each engine, as also the doors of the stables opposite, may be thrown open by mechanical or electrical arrangements by the fireman on duty, simultaneously, on receiving a call, or singly if only one engine is to be turned out

"By this arrangement the whole apparatus could be turned out at one time in a few seconds, and each engine passing out of the courtyard through the side gateway into the street, in which case, should the call be received from any of the district stations, street fire alarms, or otherwise, the general public in the neighbourhood would have no knowledge of any fire until the engines were actually on their way, as there is frequently time put off in getting away from the stations through a large crowd lecting in the street while the firemen are turning out Accidents have been recorded through this cause

The first floor above engine-house I would utilise as on rooms for amusements, reading-room, and library for the fire brigade, having access to the engine-house by stairs, sliding poles, or otherwise.

"The staircase leading to the above rooms may be continued up to any number of floors above, which may be laid out as firemen's dwellings, each of which should be supplied with bath and w.c.

"The roof of this part of the building I make flat, upon which I place a washing-house, and the remaining part of the roof would be available for drying clothes, etc.

"The rooms above the stables could be used for hay-lofts, stores, and coachman's house

"On one corner of the courtyard I erect a tower of sufficient height to get a good observation over the town or city. On the ground floor of this tower I place all necessary appliances requisite for washing the flax hose so generally used throughout the country, as also a heating apparatus, having flow and return pipes, placed in such a manner as would give sufficient heat for drying the same, blocks and tackle being also provided for hoisting the hose up in the tower for draining and drying purposes On one side of this tower I place a stair leading up to the top of the tower, and adjoining this staircase I erect workshops On the ground floor I place the engineers' and smiths' shops, and the upper floors I utilise as additional workshops, stores or otherwise, for painting and repairing the engines, hose, and other apparatus belonging to the fire establishment

"On the top of the tower I place a small watch-room or lookout for one or more firemen doing duty there, as also a compass, and round the outside of this compass I place, in large letters, the names of the various district stations, and position each occupies throughout the city, so that on a light shewing the man on duty could instantly give the firemen on duty in the watch-room of the fire station below the particulars and nearest district station to the said fire, or the firemen on duty below could make any enquiry of the man on the tower should he get any call below as to what state the fire may be in—if shewing a light whether serious or not. The communication between the firemen on duty in the watch-room of the fire station below and the man on duty in the tower above may be made by speaking-tube, telephone, or otherwise."

Although this statement of Mr Wilkins' was compiled twenty-three years ago there is but little to add Chief Officer A. R. Tozer, of the Birmingham Fire Department, writes that he "quite agrees with the general tone of it" He also observes:—

"Sites for all the District Stations in Birmingham have been selected in main thoroughfares, and, where possible, at street corners The station becomes more conspicuous, and in my opinion you are able to arrange a better turn-out. The buildings are of two storeys, with the engine-room, duty room, and officer's house on main road, with the stables immediately at the rear of the engine-room, these have been arranged so that in the event of all motors being adopted the stable can easily be converted, and the turn-out being made into the side street At the rear of the stables is placed a Hose Tower (60 feet), loose box, harness room, hay and straw store, and workshop Across a spacious drill yard are the married men's quarters, these are constructed on the flat principle. A flat roof is arranged over these buildings on which is provided a general wash-house, drying-room, and coal store.

"Each flat consists of living room, three bedrooms, pantry, scullery, bathroom, and w c The walls are made thick enough so that an additional storey may be added

"On the first floor directly over the engine-room is the recreation room and single men's cubicles, mess and bath-rooms, communication to the engine-room being made by means of two sliding poles A repair pit is constructed in the workshop and is made water-tight with a 6-inch main running in so that motor or steam fire engines can be tested and worked from same.

"It will be seen from the above that the stations have been erected on very similar lines to that described in your Handbook, and in my opinion you cannot build a fire station to be more serviceable."

There is no prominent novel feature in connection with the new fire station of to-day unless it be that one searches in vain for the familiar stable and horses at the back of the engine-room The petrol motor, in spite of its beneficial effect on the efficiency of fire brigade work, has at least robbed it of its most picturesque asset Without horses, the fire engine forms a much less valuable subject for the artist's canvas

As an example of an up-to-date station for an all motor brigade, I may give a brief description of the excellent building which has recently been erected at Bromley (Kent), to the designs of the Borough Engineer, Mr Stanley Hawkings

The engine room—some 31 feet by 28 feet—has two sets of folding doors in front, and also sliding doors leading to the yard at the rear On the right facing the street is the watch-room, and behind that the superintendent's office, with separate doors leading from his bedroom and sitting-room respectively Behind that again is the duty room, a comfortable apartment containing a billiard table On the left side of the station is a spacious workshop, fitted with an overhead travelling crane, and also with an inspeciton pit In this room stands the steam fire engine, a relic of the days that were, for Bromley is now an all-motor brigade, and the steamer is now regarded as a standby for use in the unlikely event of the occurrence of something very big in the way of fires This workshop is fitted with folding doors in front, similar to those in the engine-room

On the first floor are the quarters for married men, each consisting of sitting-room, kitchen, scullery, and bathroom, with three bedrooms above, each set of quarters thus forming quite a little house in itself. Five sliding poles lead into the engine-room, so that every facility exists for a quick turn-out A staircase in the hose tower leads on to a flat roof, from whence a ladder leads to the top of the tower, 55 feet above ground, from which point a very fine view of the surrounding country may be obtained The hose tower leads down into the basement, and at the ground floor level an opening is provided through which the hose can be passed after washing, enabling it to be hung up for drying with a minimum of trouble In the basement is the heating apparatus, with commodious hot rooms for drying wet clothing, etc The whole building above ground is heated to an equable temperature, even the large engine-room striking one with a sense of comfort on a cold day The lighting is by electricity throughout, and, by means of a red and a green lamp operated from the watch-room, the signal shewing which machine is to turn out is given—red for the first-aid motor and green for the motor pump

The superintendent's quarters are on the ground floor and consist of three bedrooms, sitting-room, kitchen, scullery, bathroom, and w c There are separate doors at the side and rear The drill yard is covered in asphalt and is roomy and convenient. There are seven coal cellars on one side, besides a large shed for bicycles and perambulators, and on the opposite side are separate battery, oil, coal, petrol, and sundries store-rooms Flanking the approach to the station is a piece of ground which has been allotted for gardens, each fireman having a plot of his own

In connection with fire stations it is as well to mention the subject of quick hitching arrangements for turning out horsed machines They need not, however, be particularly described, because they are unsuited to all but a few brigades, as, for their working, it is necessary that the firemen should live on the premises, and should be on duty both by night and by day This, of course, is impossible, except in the case of professional and a few of the larger police fire brigades The arrangements for quickly hitching manual and steam fire engines will be described in the chapter devoted to these appliances.

A word may be added as to the decoration of fire stations. It is obvious that the first essentials in a fire station are order and cleanliness, but when these have been secured there is no good reason why there should not be ornament as well There is, however, no room for the ornamental in such a place when it interferes, to the smallest extent, with the use and purpose of the station, and in the engine-rooms and all other parts that are not devoted to rest or recreation, ornament is almost unallowable There can be nothing there more suitable or more artistic than the neat and orderly arrangement of the apparatus—bright, clean, and ready for instant use.

But in the watch-room, recreation room, or library, artistic decoration is appropriate, and, it might also be said, useful For everyone is more or less affected by his surroundings, and when, as in this case, much time has to be passed every day in one room, it cannot be altogether a matter of unconcern whether that room is decorated only with a deal table having a quart pot upon it, or with ornaments which have some pretence to being artistic, and which elevate the mind instead of the animal spirits

It is, of course, possible to make the apparatus itself minister to the beautiful On the other side of the Atlantic this is frequently done, as much being expended upon the decoration of a steamer or hose carriage as upon the essential parts of the machine itself The idea does not very much commend itself to English firemen, in fact I know of but one engine which was ever got up ornamentally, regardless of expense. This was the manual presented by the inhabitants of Lambeth to Mr Fred Hodges, on each side of the hose box of which were six panels of different sizes, the centre one having a pedimental top, in which were placed bronzes, in bas-relief, of firemen's helmets and accoutrements The driver's seat was richly ornamented, and the footboard was supported by a bronze dragon The main shaft at the back passed through the mouth of a dolphin set up vertically. The painting was gorgeous, and the lamps were worth nearly as much as an ordinary manual This engine, as I said, is unique, our firemen usually contenting themselves with machinery constructed upon sound mechanical principles, without much concern as to whether they are decorated in accordance with the principles of art

One of the most appropriate of fire station decorations is an artistic arrangement of fire relics, of which, in every large brigade, a number can always be collected without much difficulty, such as examples of the curious effects of heat upon various substances, which may be gathered at most fires, and the invariable accumulation of battered helmets and accoutrements which occurs in every large brigade To every one of these relics there is a history, pathetic, interesting, or comic, and the memory of many deeds of courage or stupidity may be kept in mind by their aid Then much may be done with a few spare hatchets, axes, branchpipes, torches, and lamps; a little bunting, a few good paintings, drawings and engravings, and a model or two, properly disposed, in fact, there is little which the artistic mind cannot press into the service of the beautiful If I am asked, for what good? I reply, putting it only on the lowest ground, to give pleasure to those who constantly occupy the station apartments; that is in itself sufficient, seeing that no time is wasted, no money spent, and nothing useful sacrificed in order to attain the object. There is, in every brigade, ample time both to arrange and to enjoy

Then, not only should the eye be pleased, but the living rooms should be furnished with a little food for the mind. Certainly, much that pleases the eye may have educational value, but books are wanted as well. In some brigades there are good libraries, but, unfortunately, in very few It may not be possible always to have a library, but there is no station so small that it cannot hold a few books—those relating to professional matters, and a little wholesome literature of the general kind If books of this sort are accessible they will be read, if they have to be sought out they will be neglected Perhaps it may be thought that amongst firemen generally there is little taste for literature of a high character I doubt this, but if it is true, the distribution of good literature will create a taste, and, finally, a demand for it, even where one does not already exist

CHAPTER VIII.

MOTOR FIRE ENGINES

CLASSES OF MOTOR FIRE ENGINES—ADVANTAGES OF MOTORS—RELATIVE COST OF MOTOR AND HORSED ENGINES—THE FIRE KING—PETROL MOTOR FIRE ENGINES—WARNINGS—A MECHANICAL DESCRIPTION—RECIPROCATING AND TURBINE PUMPS — STEAM VERSUS PETROL MOTORS — ELECTRIC FIRE ENGINES

We have now reached the subject of fire apparatus, and in this connection it will perhaps be well to deal first with the most perfected form of fire extinguisher, the motor fire engine Using the term in a broad sense, I shall take it to apply to fire engines for which power and suitable mechanism are employed for the purpose of propelling the machine from place to place, as well as for driving pumps or other machinery used in the fire-fighting service The most convenient manner of dividing motor fire engines into classes is with reference to the motive power employed, namely, steam, petrol, and latterly electricity, and of these three, steam and petrol motors, which have been extensively adopted in recent years, are by far the most important, the adaptation of electricity to the fire service being at present (1911) quite in the early stages, except for stationary plants

The much-discussed question as to the relative superiority of steam and petrol motors is certainly not settled yet Each class has its staunch adherents, but however great may be the division of opinion on this point, there is no question as to the advantages of both of them in many respects over the horse-drawn machines

Obvious though it may appear, unless one has had actual experience of fire-fighting, the full importance of saving two or three minutes at the start of a fire is probably never quite realised The saving of these few minutes on the road and in getting away from the station, constitutes the greatest advantage of motor fire engines. The speed of a motor in the streets is frequently double that of a horse-drawn engine in all cases except where heavy traffic has to be reckoned with, and even more in some special instances In getting away from the station quickly the horsed engine is also unavoidably at a disadvantage

The first cost of a motor is necessarily greater than that of a horse-drawn steamer, but the total cost of upkeep and working is less In a few years the accumulated cost of food and care of the horses quite balances the difference in the first cost of the two machines, to say nothing of the saving effected in damage by fire through the greater efficiency of the former It must not be forgotten that *in the end* the damage caused by a fire is borne by the whole community in quite as real a way as is the cost of a fire engine when paid for out of the rates, so that the purchase of a motor fire engine which arrives in time to put out a small fire, instead of a horse-drawn machine which would have arrived in time to hold in check a large one, is an economical expenditure

It may be interesting to compare the performances of a *steam motor fire engine* (Fire King) with those of a horse-drawn steamer

In regard to speed it is difficult to give definite figures, as the speed depends largely on the nature of the roads to be traversed, and the traffic on them Taking, however, the case of a town where there is an average amount of traffic, the speed of a Fire King may be given as sixteen miles an hour, and that of a steamer as nine On an open and level stretch the motor will do thirty miles an hour with ease, and with two good horses the horsed machine for a short distance may reach a maximum of fourteen. On hills with ordinary gradients the speed of the motor is never less than eight miles an hour, where the other engine is sometimes reduced to a walk with the men dismounted A steam motor has successfully climbed that Kentish precipice known as Cudham Church hill, where the steepest gradient is 1 in 3 7 An example of quick work by steam motor was given by the Brighton Fire Brigade when they attended a fire at Lewes about three years ago The distance from Brighton to Lewes is eight miles, mostly uphill, yet their motor steamer was pumping water on the fire twenty-five minutes after receiving the call On the road the motor is more under control than an engine which is drawn by a pair of horses The side-way swaying and skidding which are so conspicuous a feature with the latter are eliminated, and the powerful brakes enable the motor to draw up in its own length On a frosty road, also, the rubber-tyred motor is seen to great advantage

Critics of motor fire engines will nearly always lay most stress on the question of cost, and will try to shew that it is excessive That this is not so will be seen by the following comparison—the advantage apparently possessed by the horse-drawn machine vanishes on careful examination

The cost of upkeep of a horse in fit condition for Fire Service is at least £40 per annum Making no allowance for reserve animals, it will be seen that £960 is spent per machine on horses per steamer in twelve years Adding to this sum the value of the two horses and the expense of replacing them through illness or accident, we may take the cost of horsing a steamer at £1,200 for twelve years This figure takes no account of attendants' wages, and apart from this would be exceeded in most cases Taking the cost of the steamer at £400, we find that at the end of twelve years £1,600 has been spent, and every year after this about another £100 has to be provided Against this the cost of a 500-gallon steam motor fire engine is about £1,200 It is fired by oil fuel, and the cost of keeping

80lbs. of steam always in the boiler is about £40 per annum if a gas jet is used, or about £15 per annum if a special coke heater is adopted. Thus we see that in a period of twelve years some £1,400 has been spent on the motor, and there is no large bill like the £100 per annum for horsing to meet afterwards. Lest I should be accused of making the case too favourable for the motor by ignoring such items as interest on capital and the fuel bill for driving the motor to the fires, I may point out that these are more than counterbalanced by the stable attendants' wages which have to be paid by the possessors of the horsed steamer.

With petrol motor fire engines the "standing" costs are even less, as there is no bill to be paid for fuel used in keeping up steam in the station.

The following is a short description of a steam motor fire engine of the type which has been adopted all over the world, as well as in this country. The boiler is of the same construction as those employed in horse-drawn fire engines. It is of the vertical, water tube type, with a larger number of horizontal heating tubes, and a smaller number of vertical tubes arranged in two sets, one on either side. Water tanks holding 100 gallons partially surround the boiler. Both coal and oil may be use as fuel, no alteration to the boiler being necessary, the oil burner being merely an extra boiler fitting which is placed outside the firebox. If arranged for coal fuel two coal bunkers are placed, one on each side of the footplate, leaving room for the stoker to stand between them, and when oil fuel is adopted two cylindrical oil tanks containing sufficient oil for a 40-miles' journey are placed underneath the driver's seat. The framework of the machine is of channel steel, and the engine, which is of from 30 to 50 H.P., according to the pumping capacity of the engine, and is used both for pumping and propelling, is mounted across it in front of the boiler and between it and the hose box, the front portion of which forms the driver's seat, the sides supplying accommodation for the firemen. A substantial countershaft with the differential gear nearer one end is carried by brackets secured to the framework slightly in front of the engine. The ends of this countershaft carry the sprocket wheels, which drive the chain wheels attached to the back road wheels, through roller chains When arranged for propulsion the engine drives on to the differential by spur gearing; the smaller spur wheel slides on a feathered portion of the crank shaft, and may be thrown in and out of gear by the operation of a lever pinned in a quadrant which is situated on the near side of the vehicle The pump, which is situated vertically underneath the engine, is a slight modification of the well-known "Greenwich Gem" type, which is described in the following chapter, connecting rods are employed instead of the slot link mechanism, and the stays between the steam cylinders and the pump form the crosshead guides A link motion reversing gear is added, and the pump rods are provided with a threaded collar, by means of which they can be attached to screwed sleeves projecting downwards from the engine crossheads The pump is, of course, disconnected when the fire engine is travelling on the road On arriving at a fire the differential is thrown out of gear and the pump is coupled up, an operation which takes 30 seconds The steering is on the Ackermann principle, and the engine is controlled by throttle and by "linking up" in the ordinary way There are two brakes, one on the countershaft operated by a foot pedal, and a hand brake which works on the inside of the rear wheel hubs The wheels, which are of the artillery pattern, are preferably rubber-tyred A special coke heater, designed for the purpose of keeping 80lbs of steam in the boiler of the engine when standing in the station at a trifling cost, is frequently supplied with these machines The apparatus consists of a slow combustion boiler (requiring attention once in twelve hours) and is connected to the boiler by means of flexible metallic tubes with instantaneous couplings The movement of the engine as it leaves the station disconnects these tubes, at the same time closing the cocks leading to the boiler The fuel cost of such a heater is from £10 to £15 per annum

The last few years have undoubtedly seen a wave of popularity in favour of *petrol motors,* though there are many firemen who, having had experience of both steam and petrol motors, hold that the former will yet see its day of triumph The petrol motor fire engine is the machine *par excellence* for getting away from the station quickly, and thus saving those important few minutes at the start of a fire Remarkably quick turn-outs are constantly being made by brigades possessing this class of appliance, and to their value high tribute is often paid by public officials

I do not propose to give an elaborate history of the development of petrol motor fire engines, which has been most rapid, but rather to describe a few types of this class of fire appliance, and to give a few suggestions to Volunteer Brigades who may be considering the question of acquiring a motor, as to the most suitable kind for their purpose

The first petrol motor fire engine was a first-aid machine, and was supplied to the Tottenham Brigade in 1903 In the next year the first petrol motor pumping engine was constructed Since then motor pumps have been supplied to all the largest towns in this country and abroad, and the motor vehicle has been arranged to carry turntable escapes, the ordinary pattern of fire escape, and all forms of first-aid appliances The speeds obtained on the road with these machines are in excess of any other type of fire engine The first petrol motors were fitted with engines of 20 to 30 horse-power, which were the largest then obtainable, but some of the latest utilise powers as high as 80 horse-power, and the speeds obtained on the road with these are as remarkable as they are dangerous

In this connection I may mention that it is a very debatable point whether 80 horse-power is not too great a power to be used with advantage There is much to be said against it, and with any but an experienced driver such a power is a source of danger to the machine itself as well as the public I strongly recommend Volunteer Brigades not to have a machine with a larger motor than 50 horse-power, this is sufficient to drive a 450-gallon pump at pressures up to 150lbs per square inch, it will carry a car weighing four-and-a-half tons at thirty-five miles an hour on a level, and will climb gradients of 1 in 5 It is difficult to see in what way an 80 horse-power machine can improve on this With the higher power the chassis must necessarily be of stronger and heavier construction, and there will be much increased strain on the tyres and transmission gear It is frequently impossible to obtain as much as 450 gallons of water per minute from the mains, so that except in very special cases a larger pump than that which a 50-horse motor will drive effectively is useless, and thirty-five miles an hour is surely as fast as it is safe to drive a machine of such a weight along the road. Practically the only purpose for which the full power of the heavier machine can be utilised, is to obtain a high speed on hills One danger which is always present is that of putting in the clutch rather quickly, this may easily be done in the excitement of a turn-out, and may result in a wrecked gear box or a broken transmission shaft

A much-discussed point in the choice of a petrol motor, is as to what is the best number of cylinders Opinion wavers between four and six I think that the four-cylinder motor is the more serviceable for fire brigade purposes. A slightly more even torque is obtained with a six-cylinder engine, but to set against this we have the increased number of working parts A petrol motor is at the best a delicate and intricate contrivance, and simplicity should at least be the ideal of fire-fighting appliances.

The tendency to put too many eggs in one basket should be avoided If a motor carries a pump and an escape, besides half-a-dozen men, it is well to be satisfied with this, and not to put chemical cylinders, hose reels, etc., on the same machine The advent of the high power petrol motor has encouraged the growth of such "moving fire stations," which are undesirable, both on account of the difficulty of controlling them in traffic, and their great weight, also because such a small thing as a piece of dirt in the petrol feed pipe might put the whole of a brigade's fire appliances out of action For a brigade which desires a motor equipment, and is not handicapped by lack of funds, it will be found best to employ two machines, one which carries a pump and has seating accommodation for six or eight men, and a first-aid engine on which are carried the escape, chemical cylinders, and a large quantity of hose A turntable escape is as a rule a machine complete in itself

It is outside the scope of this book to enter into a lengthy statement of the merits and demerits of the component parts of a motor chassis Such matters are dealt with every week in the periodicals which are concerned with motor commercial vehicles, but I am afraid not always with perfect impartiality After all is said and done, many disputes refer to what are largely matters of taste and individual opinion It will be sufficient to briefly state the features which are embodied in the majority of up-to-date fire engine chassis

The frame is of channel steel and directly bolted at opposite ends are the engine and pump The engine, which is usually of the four-cylinder type, is provided with dual high tension ignition by magneto, and coil and battery. The carburetter is of the multiple jet, quick starting type, and the governing of the engine is by throttle. The lubrication is of the mixed forced and splash type, and the coolness of the engine when pumping is ensured by keeping the radiator water tank overflowing with water byepassed from the main pump The engine power is transmitted through a multiple disc clutch operated by a pedal, to a gate change gear box, which provides three speeds forward and one reverse The drive is further carried to the road wheels by chains driven by sprocket wheels on the differential shafts When it is desired to use the engine for pumping the change speed lever is put in the neutral position, and a dog clutch, connecting the first motion shaft of the gear box to a shaft carrying a toothed pinion, is engaged This pinion engages with a spur wheel on the pump shaft, though it should be mentioned that in many of the latest machines a silent chain drive has been employed instead of spur gearing Two brakes are provided, one acting on the drum mounted on the second speed shaft of the gear box, and the other on the inside of the hubs of the back wheels, the former is operated by a pedal and the latter by hand

The only reciprocating pump that has been successfully arranged for work on a petrol motor fire engine chassis in this country is the "Hatfield" This pump is now so well known that a detailed description is almost unnecessary The difficulty that the designers had to face was that of producing a compact pump that could be placed across the chassis, and that did not embody the weakness on suction lifts that is commonly associated with short stroke pumps This was achieved in the "Hatfield" pump by arranging three plungers radially round one crank, and coupled to it with straps, to reciprocate actually in the valve box, and dispensing with the pump barrels altogether In this way the air space was reduced to a remarkably small percentage of the displacement volume, thus enabling vertical suction lifts of 27 feet or more to be obtained with this pump without priming In this pump the main casting is divided into two by a longitudinal partition running round it, one half being connected to the suction pipe and the other to the delivery. The valves, which are of the rubber disc type, surround the plungers, the suction valves subtending one-half of their circumference and the delivery valves the other, and the action of the pump is to transfer water from the suction chamber to the delivery side. The crank chamber is completely enclosed, and the only visible moving parts are the tailrods of the plungers projecting through the valve box covers, all the working parts are thus well protected from dirt and grit Splash lubrication serves all the working surfaces except the gudgeon pins of the two top plungers, which are oiled by siphon from oil reservoirs in the hollow tailrods

The question of pumps for petrol motor fire engines is one that at this time is attracting the attention of all interested in fire brigade matters. The "Hatfield," which, as I have said, is the sole representative of the reciprocating class of pump, has had to compete recently with turbine, and to lesser extent with toothed wheel rotary pumps. The latter have not been adopted much in this country; they have met with a measure of success in America for discharges of not more than 250 gallons per minute, but they were given very extensive trials there quite fifty years ago, and were more or less abandoned as inefficient. The great trouble with them is loss of power of suction owing to leaks between the teeth and the pump casing after a very little wear. The turbine pump is a more serious competitor, but it unfortunately possesses the inherent defect of being unable to pick up its water in starting. Some means of priming the suction pipe has to be provided Two systems have been tried; in one of these a tank of water is carried on the fire engine, by a suitable arrangement of valves the water is let into the turbine casing, the suction pipe being shut off; when the pump is started the water passes through an air ejector connected with the suction pipe, thus exhausting it, and back again into the tank. When the suction pipe is completely exhausted it is placed in direct communication with the pump, the tank is shut off, and the machine is ready for work. In the other system an air pump, driven by a chain from a wheel on the transmission shaft and engaged by a clutch operated by a pedal, is used for exhausting the suction pipe During this operation all delivery valves must be closed outright, and when the pump picks up its water they may be slowly opened. In both systems the use of a foot valve on the end of the suction pipe is advisable, although not absolutely necessary

The advantages claimed for the turbine pump are its silence, the absence of vibration, the evenness of discharge, no air vessels being necessary, and the impossibility of bursting hose by closing the delivery outlets The disadvantages are the inherent suction defect already mentioned, the low efficiency, a 75 horse-power motor being the standard for a 450 gallon turbine pump as opposed to the 50 horse-power used for the 450 " Hatfield " reciprocating pump, and the fact that the pressure depends primarily on the speed of the pump and not on the size of the nozzle, as is the case of the reciprocating pump. This last is a most important point It means that should the motor work badly or even weakly in one cylinder, so that the speed drops, say, 10 per cent , the pressure which varies as the square of the speed will drop 19 per cent.; also, that the engine must be run at only a slightly lower speed to supply one jet at 100lbs. per square inch than to supply four jets at that pressure. So far from varying directly with the speed as with reciprocating pumps, the discharge is very little dependent on it, with constant pressure.

The advantages of the reciprocating pumps may be summed up in the few but comprehensive words—perfect suction, high efficiency, and economical regulation.

I think that the absolute necessity of introducing some more or less complicated device for priming the suction pipe makes the turbine inferior to the reciprocating pump for work at fires. As I have already said, the ideal of all fire appliances is simplicity. In the excitement of the moment a well-designed though complicated suction device often fails to work, and the deeper the lift the more trouble it is likely to give A recent large fire at Buenos Aires served to emphasise this Conditions required a 23 feet lift There were three steamers with reciprocating pumps, and two petrol driven turbines on the scene. The steamers all got to work, one turbine succeeded in getting water after many minutes' delay, and the other turbine failed entirely These turbines were not of British manufacture, but that does not affect the argument The advantages claimed are more fancied than real It may be strictly true that a turbine *pump* is slightly more silent and causes less vibration than a reciprocating pump, but that a turbine fire engine possesses these qualities absolutely I am not at all disposed to admit, most of the noise of a motor fire engine comes from the motor, and in my experience noise and vibration are worse on turbine fire engines, owing to the racing of the engine that is required to obtain a high pressure

I mentioned before that the question of the superiority of the steam over the petrol motor fire engine—or *vice versa*—had not yet been settled It may, therefore, be well to set down a few points which are commonly brought forward in this connection The steam motor is not so speedy on an open stretch, though it can keep pace with the petrol motor in traffic. It requires less horse-power to drive the pumps, as there are no transmission losses through gearing, etc., the pump being direct coupled. The machinery of a steam motor is not delicate and complex, and there are fewer working parts; for example, there is no clutch, gear box, or reduction gear for the pump. On the other hand a petrol motor machine possesses the advantage of speed, and does not entail the expense and trouble of keeping up steam in order that it may start away immediately on the receipt of a call.

It requires less attention when pumping, as there is no injector or feed pump to attend to; and it is better adapted for carrying an escape or other appliances, in addition to the pump, in cases where this is necessary I think the balance turns in favour of the steam motor on the ground of simplicity, for Volunteer Brigades, and especially for Country Brigades, where several minutes are occupied in collecting the men In such cases it would not be necessary to keep up steam in the boiler, it would be the work of the fireman on duty to light the fire, and steam would be up by the time the men had assembled.

Of *electric motor fire engines* it is somewhat early to speak. Electricity has not yet asserted itself in the fire service except for stationary plant, where it has a field in which its supremacy is undoubted Many years ago a horse-drawn electric fire engine was constructed by my firm, in which a pump was driven by an electric motor, the electrical power being supplied through cables connected to the street mains, but up to the present time there are not a sufficient number of electric plugs along the streets of even our largest towns to encourage this class of machine Nevertheless, it is quite possible that the motor fire engine of the future will have its pumps driven in this manner, while the motive power for travelling on the road will be derived from storage batteries Until the provision of electric plugs at short intervals along the streets of our towns is an accomplished fact, the electric fire engine must be a first-aid machine pure and simple, for no storage battery of reasonable weight has yet been heard of—except in the columns of the morning newspapers—that would keep a pump of ordinary capacity running for even one hour As a first-aid machine the electric machine is more likely to become popular. Fire engines of this class, of foreign manufacture, are in use in Vienna other Continental cities, where they have proved effective; and they have also recently been introduced in this country in Liverpool and London Brigades. I have myself been experimenting during the last few months with an all-British machine, with a view to finding out the possibilities of a heavy machine driven by means of storage batteries I must warn my readers against believing the accounts of the remarkable performances with which such vehicles are frequently credited, both in the press and from the mouths of interested persons The fact is that the amount of power that can be obtained from a storage cell suitable for rough treatment over roads, per lb weight, is a perfectly well-known figure and does not vary 10 per cent over all the first class makes, so that any freak performance one hears of should be at once discredited. Much can be done by "tuning up" a battery. This is done by continuously charging and discharging a battery for long periods prior to a test, I recently heard of a case in which this was done for a fortnight, thus making the test valueless from a practical point of view. I will record one other instance in order to emphasize this point There is alleged to be in existence a certificate duly signed by well-known officials, testifying a run of an electric vehicle from London to Brighton on a single charge—a truly wonderful performance The car did in actual fact arrive in Brighton under its own power, but the certificate does not mention how many miles it was pushed along the road by relays of men in the middle of the journey' At least this is what I have heard, but I don't personally guarantee the truth of the story.

The machine with which I have been experimenting was constructed at Greenwich and carries a chemical cylinder and escape, and a large hose box, the combination weighing rather over four tons. Two motors of ten to fifteen horse-power are driven from a 75 cell storage battery. Trial runs have shewn that a speed of 25 miles an hour can be maintained on a level, gradients of one in ten negotiated at a speed of 14 miles per hour, and

30 miles can be traversed before the batteries require re-charging. This would seem to demonstrate that there is a distinct field for electric motor first-aid machines in towns where calls are received from places not more than ten miles distant from the station The chassis of the machine is very simple The motors, which are not mechanically coupled in any way, drive the sprocket wheels of the chain drive through worm gears No differential is required, and the heavy gearbox of the petrol motor machine is supplanted by a light electric controller which provides five speeds forward and two reverse There are two brakes, one on drums mounted on the sprocket shafts, operated by a foot pedal, and a hand brake which works on the inside of the rear wheel hubs The batteries are carried inside the body of the car at the back Many of the Continental electric fire engines are provided with wheel hub motors, but there seems to be little doubt that the arrangement that I have just described is more efficient, as the amount of power wasted in the worm and chain drives is more than counterbalanced by the low efficiency of wheel hub motors

CHAPTER IX.

HORSE-DRAWN FIRE APPLIANCES AND FIRE FLOATS.

CLASSES OF HORSE-DRAWN FIRE APPLIANCES — ADVANTAGES OF STEAM OVER MANUAL FIRE ENGINES—COST OF WORKING AND REPAIRS—USE OF STEAMERS IN CONJUNCTION WITH A HYDRANT SYSTEM—THE GREENWICH GEM—OIL FUEL—STEAMERS FOR LARGE TOWNS—LIST OF GEAR FOR STEAMERS—HORSE-DRAWN PETROL ENGINES—FIRST AID APPLIANCES — THE CHEMICAL ENGINE — THE LONDON BRIGADE MANUAL—LIST OF GEAR FOR MANUALS—MANUALS FOR HOT CLIMATES—FIRE FLOATS

HORSE-DRAWN fire appliances may be divided into four classes, which I propose to deal with separately The first and most important of these is that class of machine in which steam is used for the purpose of driving the pumps, second, petrol motor pumping engines; third, first aid fire appliances, and last, the old-fashioned manual

Having reference especially to the smaller towns in which the acquisition of a motor may be impracticable, I would like to urge upon those who are able to influence the decision arrived at as to the fire equipment, that there are many important advantages to be gained by adopting *steam fire engines* in preference to hand-worked machines. A steamer is superior in regard to the cost of working, and in pumping power both as to pressure and quantity delivered, it is quickly got to work, and can be maintained at little more expense than a manual. With reference to the cost of working it may be mentioned that a steamer requires only one attendant; and that an engine of average size consumes about one cwt. of coal per hour, the total cost per hour, whilst actually at work, including oil for lubrication, being half-a-crown, if oil is used for fuel the cost of working is rather higher, but there are advantages gained in return for this to which I shall refer later on. A hand-worked engine is more expensive Pumpers are paid from sixpence to a shilling per man per hour; and there must be at least one relay, as the labour is too hard to be performed without frequent intervals of rest An engine to be worked by 26 men would, therefore, cost at least £1 6s. per hour for pumping alone The cost of refreshments must also, in most cases, be added, say 5s per hour At least, then, the total cost per hour would amount to £1 11s In regard to pumping power, a steam fire engine of average capacity, say to deliver from 300 to 400 gallons per minute, will pump with effect through as much as 3,000 ft of hose, even at great elevation, say 100 ft The engine of such an appliance is of 32½ indicated horse power, and one hundred strong men would not be able to supply such a power as this for any length of time The manual will not pump with effect through more than 500 ft of hose, particularly if the hose has to be carried up hill The pressure on the steam fire engine jet is not less than 100 lbs per square inch, being twice as much as that upon a manual engine nozzle, which is not more than 50 lbs per square inch when working through 500 ft of hose Then, in regard to the quantity, as the steam fire engine can always be worked at full speed, the quantity discharged is not diminished however long the engine may work, unless it is considered advisable to reduce it A 26-man manual engine, when worked at full speed, gives 115 to 120 gallons per minute, but the pumpers soon relax their exertions, and three-fourths, or even less, may be taken as the actual average quantity discharged For this reason a fire can be attacked by a steamer from a much greater distance than by a manual engine, which is practically ineffective when a great body of flame renders the actual seat of the fire unapproachable, or when the available source of water is at a distance from the fire A steamer can be moved about with as much facility as a manual, and can be got to work quite as quickly

The supposed heavy expense attached to the maintenance of steam fire engines, and of executing what repairs may, from time to time, be necessary, has often been urged as a reason against their acquisition I am of opinion that the misapprehension on this point was one of the principal causes which impeded the progress of the steam fire engine in its early days, and, indeed, at the present day one sometimes hears such an argument put forward To remove this misapprehension, I collected reports from the chiefs of large fire brigades, shewing the cost of keeping, for a year, the steam fire engines belonging to their department I ascertained that a number of brigades, amongst which were those in such busy towns as Blackpool and Bristol, had been able to work their engine for four or five years or more, and at the end of that time to certify that it cost nothing at all for repairs Quite recently the Bridgnorth Brigade reported that their steamer had cost nothing for repairs for the last seventeen years Northampton reported that the engine had cost £5 in four years Liverpool reported that in eight years of service the cost of repairs to one of their machines amounted to £10 Manchester reported that average cost of repairs was fifteen shillings per month From every town the report received was confirmatory of the opinion that, now the manufacture of steam fire engines had been brought to such a state of perfection, especially as regards simplicity of construction, and durability of parts, these machines, with but ordinary attention, and even without skilled labour, would last many years, and do a wonderful amount of work, without a single penny being spent upon them for repairs

Another objection sometimes taken to steam fire engines is that, owing to an efficient hydrant system upon high pressure mains, mechanical power for propelling fire streams is not necessary in the town. This was once the opinion in some quarters in regard to London, and in order to thoroughly investigate the matter the Metropolitan Board of Works ordered some experimental investigations to be made They were undertaken by Sir Joseph Bazalgette, assisted by other well-known engineers. Now the water supply of London, if very far from perfect, is at least equal to the average, taking one town with another, throughout the country It was at this time furnished by eight companies the Lambeth, giving a ruling pressure of 115 feet head, the Kent, 90 to 115 feet; the New River and Chelsea, from 70 to 80 feet, the Grand Junction and Southwark and Vauxhall, 60 to 70 feet; the West Middlesex, 60 feet, and the East London, 35 to 45 feet At the present time the whole water supply is governed by the Metropolitan Water Board, but the pressures remain the same in the respective districts served by the old companies The best of these pressures (115 feet), with a couple of hundred feet of hose, would hardly throw 150 gallons of water to a greater height than 40 or 45 feet At the time the experiments were undertaken one question under discussion was whether the water arrangements could not be so much improved that steam fire engines might be dispensed with Sir Joseph Bazalgette and his colleagues, in their report, demonstrated that this was not possible They shewed that, in order to deliver a stream to the height of only 60 feet through 200 feet of hose, at the rate of 150 gallons per minute, it would be necessary, owing to friction in the pipes, to have a head at the reservoir or pumping station of from 207 to 350 feet This would furnish the required pressure at nearly all parts of the Metropolis But it would do so only when there was no draught from the mains for other purposes If water is being taken off for domestic or other uses, the available pressure is at once considerably reduced, and even this pressure at the reservoir would furnish a working stream not nearly so satisfactory as that thrown by a steam fire engine Moreover, the effect of several draughts is much in excess of the sum of what is due to each separate one, thus, in Sir Joseph Bazalgette's words, "shewing the serious practical interference with the available head to produce fire extinguishing jets which may be made by comparatively small domestic draughts along the line of main" Now, as such a pressure as 300 feet head, to say nothing of 350 feet, is very seldom attained in any town, it is manifest that there are few places in which the fire arrangements are not improved by the presence of a steamer

I may take a further illustration A head of 100 feet at the hydrant, if 200 feet of hose were attached, and 150 gallons were delivered per minute, would give only about 50 feet head at the branchpipe, and this would throw a stream not more than 30 feet to 35 feet high Obviously, the pressure required being so large, a water company can only be expected to give a sufficient quantity of water *at ground level* for a serviceable stream The pressure upon the jet must be supplied by a fire engine. A pressure of 100 feet at the hydrant, which, as we saw, only gives a 35 feet stream, would deliver into a cistern 1,000 gallons per minute This, picked up by steam fire engines, could be thrown in five jets, at the rate of 200 gallons per minute through five lines of hose, to the height of 140 feet, instead of only one stream to a height of 35 feet, which the unassisted pressure at the hydrant would furnish

It is also necessary to recollect that, as fires may break out in any part of a town, it is not sufficient if an extraordinarily good pressure is furnished by the water companies' mains, unless that good pressure is universally distributed This is very seldom the case Where a district is hilly there can easily be good pressures in the lower parts; but there will as certainly be higher parts where there can be but little pressure. The only exception is in the case of those towns which receive a water supply from very high districts at a considerable distance.

There is also another reason why steam fire engines should be maintained even in towns where there is a good hydrant pressure, viz, that it is always advisable not to depend upon one means of fire extinction only. Fires not unfrequently occur at most unfortunate times, when the ordinary water supply arrangements are out of working order This fact was illustrated by an occurrence at Wellington, New Zealand A fire broke out in a large building at a time "when the chief water supply from Wainui-o-mata had been cut off to allow the leakages in the race to be inspected, and all the brigade had to depend on for the first hour was the inferior pressure from the Polhill Gully Reservoir, which did not amount to more than 70lbs to the inch After that, by cutting off the water from the rest of the town, the pressure was increased to 120lbs" Mainly owing to this fact, the fire increased to enormous proportions, and finally caused a loss to an amount which would have been sufficient to purchase fifty steam fire engines, and to maintain them for ever

Supposing it has been decided to adopt the steam fire engine, in determining the size of the particular machine to be acquired, it is well to remember that, even in a small town, a large fire is not impossible, especially if there are a few large buildings Consequently, as a steam fire engine that will throw a large stream will also throw a small one if necessary, it is not always a good plan to have one that will throw a small stream only Of course, questions of weight, size, and expense must be taken into consideration, but now that steam fire engines are made so extremely light, and at the same time, of great power, there is usually little difficulty in coming to a decision as to which engine should be adopted In every place above the size of a mere village the advantages of engines that will throw large streams are numerous One of the greatest is very manifest when a fire brigade has to deal with a very large body of fire; here a small stream would be comparatively inoperative;

the firemen could not by its means reach the seat of the fire, for the simple reason that they could not get with the branchpipe within a distance that the small stream would cover. It will be readily understood that in this case it is not a question only of the diameter of the stream. With a small engine the branchpipe must be taken up to within a comparatively short distance of the fire, while, if a larger engine is available, it is possible from a safe distance to send a deluge into the very heart of the flame. This question was much discussed after the great fire in Charterhouse Buildings on the 8th of October, 1885. At this fire there was practically a roaring furnace three hundred feet long and a hundred and fifty feet wide The heat was intense, and the firemen, working necessarily at a distance, could not penetrate the mass of flame with the small streams available Under such circumstances manual engines are almost useless, and very small steamers only a little better In Manchester and Liverpool, and other places where the conditions are favourable, very large engines have been adopted; the great commercial port of the North possesses one capable of throwing a two-and-a-half-inch stream, at the rate of 1,800 gallons per minute

On the whole, perhaps, an engine that will deliver a continuous stream, one-and-a-half inches in diameter, to a height of a hundred feet or more, is the size that may be adopted with the best results in most places The volume of water can be used in a single stream, or it may be divided or subdivided as occasion requires But for the protection of districts spread over a considerable area on or at the side of a hill, and containing, for the most part, buildings of ordinary sort, size, and risk, and especially if the roads are not good, two or more very light machines may be acquired with advantage, a large stream, when requisite, may be obtained by joining together the lines of hose from these engines, in a way which will be more fully described later on.

The steam fire engine I usually recommend for Volunteer Brigades in villages and small towns where the risks are comparatively small, is the "Greenwich Gem." This engine has been specially designed to meet the requirements of such brigades, where the firemen and all the appliances are carried upon the engine, which is an essential in country brigades where long distances frequently have to be traversed, and where extensive districts are protected The various parts are so arranged that one man standing behind can stoke, manipulate the suction and delivery, and command the working parts without moving from his position on the footplate The engine can also be stoked whilst travelling The mechanism is of the simplest possible construction, so that any man who has worked a portable engine, or any one of ordinary intelligence, can easily work it and keep it in order For the benefit of my readers who have a mechanical turn of mind it may be mentioned that the boiler is of the quick steaming water tube type, with the tubes open at both ends to the water-space, so that a perfect circulation is ensured, and the danger of corrosion, or burning through the accumulation of deposit, is entirely obviated Wash-out plugs are provided, so that any sediment can be removed with facility The whole of the interior of the boiler is easily accessible Steam is generated very rapidly, 100 lb pressure being raised from cold water in six minutes An injector with tank and a separate feed pump are fitted for supplying the boiler with water The frame is of steel, carried on springs and high wood-spoke wheels, and forms a secure foundation to which to attach the boiler, engine, and hose-box, without subjecting them to any strain incidental to running over rough roads, the boiler and engine being so placed that the weight is distributed equally upon the hind wheels The engine is of the vertical, double cylinder, non-compounded, short stroke, high speed type, and a special feature is the absence of steam pipe, exhaust pipe, and flywheels. There are no dead points, and the engine will start in any position of the crank on the opening of the steam stop valve. It does not depend upon the frame for strength, being simply secured to it by bolts, so that it may be easily removed if required The action between the steam and water pistons is direct, by means of a steel piston-rod, and all strains are taken by the distance-piece, which also carries the crank-shaft bearing A crank shaft is provided merely for the purpose of actuating the slide valves, limiting the stroke, and working the feed-pump The crank-shaft, piston-rod and valve-spindle are of steel, and all the wearing parts are of hard gun-metal, adjustable to take up wear The pump is double-barrelled, double-acting, and of very compact construction, it is entirely of gun-metal, and the covers are so arranged that the valves may be easily examined These have large clear openings, and will not choke The suction hose is always carried attached ready for use

The engine is made in three sizes, one to throw 400 gallons per minute and to a height of 160 feet, one 300 gallons per minute and to a height of 150 feet, and the smallest 250 gallons per minute and to a height of 130 feet.

The working jets used with these are one-and-one-eighth, one inch, and seven-eighths of an inch respectively, but if the hose on the two deliveries is connected so as to deliver through one nozzle a stream of larger size may be obtained

Any of the above engines, by means of a few additional fittings, may be arranged to burn paraffin as fuel The oil burning apparatus involves no alterations beyond placing two baffle plates in the firebox when the oil burner is in use, so that should the supply of oil fail at a fire, in a district where it is impossible to obtain more, coal, which is always obtainable, may be employed without delay The advantage of this system cannot be too strongly emphasised. There have been various methods of employing oil as fuel, some involving the use of oil pumps, others in which the oil is delivered under pressure from the storage tank, an air pump being fitted for the purpose; the burners—often delicate and complicated pieces of apparatus—have been so placed as to prevent the use of coal in cases of emergency. In the system which I recommend the oil burner is merely an additional boiler fitting placed outside the firebox, and a steam jet is used to force the oil on the ejector principle, through a special form of spray nozzle By this means the oil is disintegrated and partially vapourised, no additional complicated vapouriser being necessary This arrangement is an extremely simple one, there are no additional working parts to get out of order, such as oil or air pumps, also, the paraffin is not under pressure in the tank, a practice which is most objectionable on account of the almost diabolical facility with which paraffin finds a means of leaking

The advantages of oil fuel over coal are its cleanliness and the absence of danger of setting fire to anything combustible near the engine with sparks, also no attention is required for stoking, as the oil burner, once set, does not require alteration as long as the load is constant.

The use of oil fuel is frequently objected to on the ground of expense, and it has no friend in the careless fireman who lights up the burner with an explosive mixture in the fire-box and gets his whiskers blown off in consequence It must not be thought that this occurrence, of which one hears sometimes, is a defect of the system, it can only happen through negligence or ignorance. A boiler of a 400 gallon steamer, which would require about 1½ cwts. of coal per hour when working at full load, if worked on oil fuel would use about 18 gallons of paraffin per hour Thus, taking the cost of coal at 2s. per cwt. and that of paraffin at 5d per gallon, the relative cost is as 6 is to 15 On the whole, I think the advantages are worth the extra expense The operation of the oil burner is fully described in Chapter 16

The engine described above is the one which I usually recommend for Volunteer Fire Brigades In towns where an unusually large quantity of water is available much larger engines have occasionally been adopted, but it is by no means certain that an 800 gallon steamer is so serviceable a machine as two 400 gallon engines would be for fire brigade purposes However, fire engines with pumping capacities of 500, 800, and 1,000 gallons per minute have been adopted in several large cities in England and other parts of the world The boiler is usually of similar construction to those previously described, and the pumps of the vertical type which are commonly used on the Fire Kings (steam motor fire engines) When greater capacities than 1,000 gallons per minute are required, the pumps are usually of horizontal pattern Liverpool possesses steamers capable of discharging 1,400 and 1,800 gallons per minute, but all these very large machines are quite outside the ambit of Volunteer Brigades, and it will be sufficient for the purpose of this book to merely record the fact that there are such appliances in existence, that their weight does not render them serviceable as horse-drawn fire engines, except in flat districts where a long distance call is seldom or never received, and that the water supply must be of a quite exceptional description to keep them fully supplied

In selecting a steamer it is well to remember that the most important feature of a good steam fire engine is a good boiler Without a good boiler the successful working of the machine is impossible The boiler is to the machine what the stomach is to the man It would be as reasonable to expect a man to do his work well, and to enjoy life under dyspeptic conditions, as to suppose a steam fire engine will pump on without mishap when it has a boiler, which, for any reason, is unsuitable or defective.

There is sometimes a tendency to sacrifice other valuable considerations in making steam fire engine boilers, in order to accelerate the raising of steam; of course, a most important point to keep in mind, but one which it is easy to regard to such an extent as to render a boiler constructed under this predominant idea positively dangerous A minimum of water space and a maximum of furnace space will enable the boiler to get up its steam quickly, and, as long as the ratio of the two is kept within safe limits, all will be well But the safe limits are easily passed, and when they are, the fireman has in his keeping a machine which, at any time, may cause irretrievable damage and disaster, worse, perhaps, than the conflagration it is trying to extinguish The late Captain Shaw once expressed the opinion in his work on Fire Protection (pages 61 to 63) that steam could not be raised to 100 lbs in less than 14 minutes without risk Since the work alluded to was written there have been many improvements in steam fire engines, and Captain Shaw, if he were alive now, would reduce his time by several minutes Steam can be raised to a working pressure in seven or eight minutes from cold water with safety It is seldom requisite to raise it in less time, for, reckoning from the time the alarm is given to the time the branchpipe is screwed to the end of the hose, at nearly all fires more than ten minutes will have elapsed If water is kept warm in the boiler as the engine stands in its station, the seven or eight minutes will be reduced, especially as the fuel also will be warm, and will ignite very quickly when the torch or match is applied

But even if a minute or two are occasionally lost at a fire, it is better to have a boiler which can be trusted at all times In some fire brigades, especially in the country, this loss could never happen, for the men do not all live upon the premises, and the distance to be traversed to a fire is often considerable A brigade in these circumstances gains nothing by a boiler which raises steam in four minutes, on the contrary, it loses a great deal by it, for, having no skilled engineer to manage the engine, the lacking quality of security would have been most valuable In exchange for this valuable quality of security the brigade has got a quick steam raising quality of no earthly use to it.

What a provincial Fire Brigade really requires is a boiler which raises steam in reasonable time with safety, and which can be stoked whilst the engine is moving to a fire

Where it is desired to keep water warm in a steamer boiler for the purpose I have referred to, a steam heater can be used A steam heater of some kind is almost indispensable in a fire station of a large town, and, perhaps, the kind most generally employed is a jet of gas through the well-known atmospheric burners which are so arranged as to secure the greatest possible heat from the gas With the patent heater the same result is attained by keeping the water in a boiler hot by a coke fire, but the convenience of the patent heater is much greater as regards quickness in turning out, besides which it is more economical in use, and acts as a stove in the engine house; the sediment precipitated from the water by boiling is also thrown down in the heater instead of remaining in the boiler The apparatus consists of a welded boiler with a water jacketted firebox in order to secure economy of fuel, through which the water circulates The furnace is of the slow combustion type, similar to that used in the well-known conservatory heaters The heater is compact and requires very little attention, twice a day being sufficient for the stoking Connection is made to the boiler by two tubes, the upper one conveying the hot water to the boiler, and the lower one returning the cooler water to the heater; thus a constant circulation is maintained, and the water in the boiler is kept at boiling point The connections of the tubes to the boiler are so arranged that immediately the engine is drawn away the ends are automatically closed, and, at the same moment, a damper is closed to check the fire

For fire engines to be used in hot climates wrought iron wheels are more suitable than the ordinary wooden wheels; they can be made very light, and, though somewhat more expensive, they are undoubtedly well worth their extra cost

For cold climates engines are made with special arrangements fitted to the pump to prevent the possibility of its freezing The efficiency of this arrangement has been often tried in North Russia, Siberia, Canada, and other cold climates, and never without success.

The gear and appurtenances carried with a steam fire engine will vary in accordance with circumstances The following is a tolerably complete equipment, in many brigades a considerable portion may be dispensed with —

1 Copper suction strainer, for keeping the suction hose clear of stones, etc
1 Basket strainer
4 Copper branchpipes (2 long and 2 short), for directing the stream of water at the end of the hose
2 Supports, to assist men in holding the branchpipes
6 Gun-metal nozzles of various sizes, to be fitted to the end of the branchpipes
2 Carriage lamps
3 Gauge lamps to shew light upon the pressure gauges and working parts generally
1 Pair of water bags, to protect wheels from heat of boiler
Engine, hose, and suction wrenches, and shifting wrench
Tube brush
Stoking irons, oil can
Spare pump valve facings, rubber valves, gauge glasses, and firebars
Pole and sway bars for horses
1 20 foot length of suction hose and one or two spare shorter lengths
6 100-foot and 4 50-foot lengths of plain canvas hose and couplings
1 Brigade hand pump with 10 ft hose and jet, and check valve for filling boiler.

2 Gun-metal dividing breechings and 4 extra small nozzles, for use when engine is playing 4 jets of water simultaneously

1 Patent controlling nozzle, to regulate size of jet or shut it off altogether

1 Variable spreading nozzle

1 Portable canvas cistern, with folding joints, for use when engine is taking its water supply from fire plugs

2 Copper goose necks, for use with cistern

1 Chimney fire extinguisher, for hooking over chimney

1 Direct suction coupling, for connecting suction pipe direct to hydrant or standpipe

6 Extra hose wrenches

1 Collecting breeching, for joining two lengths of hose into one, or the deliveries of two engines to work through one nozzle

6 Leather hose clips, to sustain the weight of the hose when filled with water, by placing the hook over the rung of the ladder

6 Hose clamps for stopping leakages in hose whilst at work

1 Gun-metal retaining valve to be introduced into a long line of hose when laid up a hill, so that, in case of a burst near the engine, the water may be retained in the hose

1 Suction valve for use when engine is drawing from a deep lift

1 Standpipe to suit fire hydrants or appliances

1 Set of turncock's tools for fire plugs

1 Ceiling hook, with long handle

2 Hand hatchets for cutting away windows, etc

1 Crowbar

1 Set of instruments for breaking down partitions, doors, etc

1 Felling axe, 1 pickaxe, 1 spade

1 Saw, in leather case

1 Wheel wrench

1 Speaking trumpet, for the use of the chief officer
12 Canvas buckets
1 Coil of patent rope and cross
Lubricating oil
1 Hose lever, for tightening hose after it has been coiled by hand
3 Pairs of spare hose couplings
1 Jumping sheet, if not carried with escape
2 Dozen spare leather washers, for hose couplings
1 Set of spare pump leathers
2 Balls of lapping line
2 Balls of small cord
1 Bundle of cotton waste
1 Link case, with link

To the second class of horse-drawn fire appliances belongs the machine in which the pump is driven by a *petrol motor* of exactly similar description to that mentioned in the previous chapter, which engine is not employed for the additional purpose of propelling the vehicle along the road This type of fire appliance is as yet quite novel, but appears to have a future before it The usual arrangement is to place the pump in front of the motor, thus making the starting handle of the motor the hindmost part of the machine instead of the foremost, as in motor fire engines The pump is driven through a metal to metal cone clutch, a part of which is the motor flywheel, and toothed gear wheels, or a Renold silent chain drive, the latter arrangement is on the whole preferable All the driving operations, viz , engaging the clutch and regulating the speed of the motor and the strength of the explosive mixture, are performed from the rear by means of handwheels and levers brought outside the bonnet of the motor No radiator is needed, the water for cooling the cylinders being supplied from the pump, except in starting up, when water is supplied from a tank carried on the machine Suitably arranged boxes for carrying hose and gear and providing seating accommodation for the firemen complete the machine The delivery and suction hoses are coupled at the sides of the engine Here, again, the Hatfield three-throw pump is the only reciprocating pump which can be conveniently arranged to be driven in the manner described Toothed wheel rotary pumps have been used with a certain measure of success in the United States for discharges of not more than 250 gallons per minute The principal disadvantage of this class of pump is a great falling off in power of suction after a very little wear, this makes it less effective than a turbine pump, which at least has a priming device fitted which should be in working order The combinations which I recommend are four-cylinder petrol motors of 35 or 50 H P, with Hatfield pumps of 350 or 500 gallons per minute capacity respectively

This class of fire engine should appeal to a large number of country brigades whose funds will not permit of the purchase of a motor driven machine, in hilly districts particularly the superior lightness of the petrol over the steam pump should be much appreciated Other advantages which will at once occur to the reader are the cleanliness and ease of operation of these engines, and the small amount of attention required when working, also, fuel can be conveniently carried on the machine sufficient for a longer spell of duty than on any other type of fire engine; it is superior to the motor machines in this respect, as none of the fuel is used on the road But, of course, in other respects no petrol engine can compete with steam, and no machine of this class is equal to a steam fire engine in simplicity and trustworthiness, and in freedom from all inconvenient tricks

The third class of horse-drawn fire appliances I have called *first aid machines* They may broadly be said to include vehicles which carry one, more, or all of the following, chemical engine, fire escape, hose reel, hose, and standpipes It is difficult to find an explanation of the undeniable fact that this type of fire appliance has been very much neglected, and has only come into general use within the last fifteen or eighteen years Previous to this even horsed escapes were almost unknown At fires the arrival of the escape—wheeled along the road by hand—was frequently very late in proceedings, although as the life-saving fire appliance it should be the very first to put in an appearance

It must be remembered that much damage can be done with water as well as fire, and that fires should always be put out with as little water as possible Herein lies the great utility of first aid machines To town brigades, whose calls are frequently from very short distances, so that it is only a matter of a few minutes between the receipt of a call and the appearance of the first aid machine at the fire, they are of the greatest utility They are essentially machines of light construction, and a fair speed can be attained on the road with a pair of horses Should the fire be in an early stage the chemical engine will probably prove effective in putting it out If the outlook is more serious, the escape is there to assist any persons in the burning building, and jets may be got to work with the aid of the standpipes and hose carried on the machine from the street hydrants, pending the arrival of the steamer or petrol motor

It is only necessary to examine the records of any town brigade to realise what a large percentage of calls are effectively dealt with by first aid machines; in fact, it must be a familiar sight to most dwellers in large towns to see the steamer arrive a couple of minutes or so after the first aid machine, and find that the fire is either all over or well in hand, so that it is quite unnecessary for the gear to be unpacked Certainly, no town fire brigade is complete without one of these useful machines

Escapes, hose reels, etc , are fully discussed in later chapters, so that it will be sufficient here to enlarge upon the first aid fire extinguisher proper—the chemical engine. In its most popular form the chemical engine consists of a highly polished copper cylinder, well tinned inside, containing from 25 to 90 gallons of water, according to size, 40 gallons being probably the most convenient In the water is dissolved a quantity of bi-carbonate of soda, and inside the cylinder, contained in a lead bottle with a thin metal cover, is a supply of concentrated sulphuric acid By a simple contrivance the acid may be liberated from the bottle and mixed with the alkaline solution, when a well-known chemical reaction takes place resulting in the formation of carbonic acid gas The generation of this gas in the enclosed cylinder provides the pressure which forces the whole of the liquid contents of the cylinder through a line of one-inch rubber hose and a one-quarter-of-an-inch shut-off nozzle The best way to carry the hose is on a hydraulic reel, that is, a reel having a connection to the cylinder from its axle, to which the hose is permanently connected so that any quantity can be run out with the pressure always standing Sometimes the hose is packed in a cradle, but with this method, unless great care is used in storage, it comes out in round turns with a tendency to kink The stream being partly saturated with carbonic acid gas is a somewhat better fire extinguisher than a jet of pure water would be, for the gas is itself a powerful opponent of combustion

In another form of the same appliance no acid is used The carbonic acid gas is contained in an auxiliary cylinder under very high pressure, at which it becomes a liquid This smaller cylinder is connected to the larger cylinder containing the water by a pipe, and the flow of gas along it is regulated by a valve The advantage of this method is the power of regulation that it gives With the first appliance, once the acid is liberated the whole of the contents of the cylinder must be discharged, with the latter arrangement the gas, and, therefore, the motive pressure, may be shut off at any time, and, further, the water cylinder may be filled and used again very quickly The drawbacks of the gas cylinder chemical engine are the extra weight and the trouble of getting the gas cylinder recharged A combination of these two appliances has been successfully employed by some brigades Two chemical cylinders of moderate size and a gas cylinder are fitted to the first aid machine; these two cylinders are first used in the ordinary way with a chemical charge, and if the fire is not then extinguished they are used in conjunction with the gas cylinder, one being filled while the other is working, and in this manner a jet can be kept up for a long time Compressed air is sometimes used instead of carbonic acid gas in the gas cylinders, but owing to the fact that air cannot be liquefied at normal temperatures very much less power is stored This is the general practice in the London Fire Brigade

The fourth and last class of horse-drawn fire appliance in general use consists of *manual fire engines* The best manual cannot now be regarded as an up-to-date modern fire engine, and the purchase of such a machine is only to be recommended as better than nothing at all in cases where the lack of necessary funds prohibits the purchase of more efficient apparatus

There is, undoubtedly, no better manual for a Volunteer Brigade than that known as the London Brigade pattern, which has been used by fire brigades in all parts of the country, and, in fact, nearly all over the world A detailed description of the engine is quite unnecessary, its appearance is well-known to all who have the slightest knowledge of fire brigade matters However, a few remarks may be of value regarding the construction of the patent valve box which is employed in the Greenwich type of this engine, which represents the latest and best practice in manual fire engines It is made of gun-metal instead of cast-iron, as in many of the older types, a feature which secures freedom from rust and consequent interference with the free action of the valves The valves may be lifted out from their places for purposes of examination, and are arranged to rotate on their hangers, so that if desired they may be ground on their seats in place It is only necessary to remove three screws in order to lift the valve box cover and expose the valves for examination or removal The water flows from suction to delivery with the least possible change of direction, and the very small air space enables especially deep suction lifts to be successfully negotiated The engine is made in six sizes, to pump respectively 220, 176, 136, 115, 100, and 85 gallons per minute The fourth or fifth size is that best adapted for general use Engines of these sizes are worked by 26 or 22 men respectively, and are light enough for easy transit over the worst roads These engines have two outlets, so that two jets of water can be thrown simultaneously, and each carries eight or ten men, in addition to the driver

The working parts of a manual engine should be always of the highest class of workmanship, there is all the difference in the world between an engine built by an ordinary pump maker, or by a good house on the ordinary pump maker's system for the sake of cheapness, and one constructed as a fire engine should be Steam fire engines are necessarily well-made, but in some cases this is not so with manuals I consider that any fire engine, whether it is to be worked by hand or by steam, should be of the very highest class, the material ought to be the best of its kind in every way The pump, cylinders, valves, and pistons, suction and delivery ways, should be made of good honest gun-metal, and not of yellow brass The timber for the cistern, hose box, etc , should be either mahogany, walnut, oak, or teak The capacity of the air vessels should be ample There should be no malleable iron in any of the working parts, which should be wholly of wrought iron or steel Of course, a thoroughly well-made engine costs more than a combination of pine wood, cast iron and yellow brass thrown together by labourers or boys, but it is well worth the extra sum paid for it

There have been many little improvements in manual fire engines for the purpose of enabling a brigade to get quickly to work at a fire These have been adopted in country districts which depend entirely upon manuals, but have not made their way into the larger brigades Amongst other little additions, the pumping levers are fitted with a spring catch locking arrangement, by means of which they are locked automatically when thrown over This catch is effective in its operation, and is not liable to get out of order The hose box lid is provided with a spring catch, which locks it automatically when the lid is closed The upper transom plate of the engine is fitted with a sliding bolt, which, when the engine is travelling, is sustained out of gear Upon arriving at the scene of action, when the holes in the transom plates are brought immediately opposite each other, the bolt locks the fore carriage automatically The pumping levers are secured for travelling by a bolt sliding in a lever on one side, and engaging in a suitable perforated plate in the suction pocket, this bolt enables them to be carried in a perfectly level position, and to be instantaneously disengaged The pole is fitted with a patent disengaging crab, by means of which the horses may be instantly released on arrival at a fire, or in the event of falling, and also with two patent sway bars with patent snap hooks to the splinter bar, which enable the horses to be instantaneously released There is much difference of opinion amongst practical firemen as to the real value of these arrangements, and in mentioning them I must not be considered as expressing an opinion upon their utility, either in one way or the other

The 'gear to be carried with a manual varies quite as much, under different circumstances as it does in the case of steam fire engines The following list will, however, be found applicable in many instances —

6 40-foot lengths best copper riveted leather delivery hose, with gun-metal swivel coupling screws
2 100-foot and 3 50-foot lengths best quality double substance canvas hose, and gun-metal swivel coupling screws
4 6½-foot lengths best copper riveted leather suction hose, and gun-metal swivel coupling screws
1 Copper strainer
4 Copper branchpipes
6 Gun-metal discharge nozzles, hose wrenches, engine wrench, screwdriver and shifting handle
1 Jumping sheet (if not carried with escape)
2 Scaling ladders
2 Dozen spare leather washers for hose screws
4 Spare hose straps
1 Standpipe, double outlet for street plugs or hydrants
1 Goose-neck
1 Handpump, with 10 feet of leather hose and nozzle
1 Dozen canvas buckets
1 Folding canvas cistern
1 Pickaxe
1 Spade
1 Saw (in case)
1 Large axe
1 Crowbar
1 Breeching to work two jets from one hose
1 Set of fire plug keys
2 Clips for suspending hose on ladders
1 Ceiling hook or preventer.
1 Fan spreading nozzle

1 Basket strainer with strap, to be used when working with foul water from ponds, etc.
3 Hose clamps for stopping leakages in hose
1 60-feet coil of line.
2 Balls of lapping line
2 Balls of small cord
1 Oil can
2 Gallons of hose oil
2 Brushes
2 Gallons of engine oil
1 Bundle of cotton waste.
2 Lamps (always trimmed and supplied with oil)
1 Link case with link (for winter months)
1 Chimney fire extinguisher
1 Speaking trumpet

Country brigades should add a fire-proof rick cloth, 40 by 30 feet, by which adjacent ricks may be protected from fire and smoke

In outlying suburban stations it is sometimes found advisable to have a small manual, which can be readily drawn to the seat of the fire by hand The engines mostly employed for this purpose are called Hand Curricle engines, and are mounted on a pair of high wheels They are light enough to be drawn by a single man for a considerable distance There is a large hose box for carrying the hose and working appliances, and the pumping levers are arranged to fold over, or unship, so as to allow the passage of the engine through narrow courts and alleys

In addition to the two I have mentioned specially there are many varieties of manual engines made, but few are applicable to Fire Brigade purposes One called the country brigade engine is sometimes adopted by village brigades for the sake of cheapness, in preference to the London manual The former is, perhaps, as good a machine for pumping, but it is not to be compared with the London engine in regard to the comfort and convenience of the carrying arrangements It is necessarily without a footboard, the men's feet, when riding, being upon the pumping handles The London Brigade engine is also much better in regard to the accommodation for the hose and gear

For use abroad, engines with copper or iron cisterns, and with iron wheels, are frequently required, and these are made, as a rule, to be drawn by a large number of men instead of by horses Sometimes a wooden cistern engine has light wrought iron wheels, in preference to wood wheels, which do not always stand a warm dry climate very well For use in American towns, where the firemen are not required to ride upon the engine, and where the hose and tools are also carried separately to fires, engines are constructed somewhat differently As far as the working parts are concerned, they are exactly upon the lines of the London Brigade pattern engine, the pumps, however, are not covered in, but are left exposed, and both the barrels and air vessels are highly finished and polished There is neither hose box, driver's seat, nor suction pockets The engine may be accompanied to fires by a hose cart, or it may be fitted with a hose reel fixed over the cistern Instead of horse-pole or shafts, it is fitted with a long curved drag-handle of polished iron, for men, shackles are also provided, to which drag ropes may be attached Four suction hoses are arranged on a polished iron frame, with suitable brackets, two lengths being always attached to the suction inlet, other brackets are also provided for branch pipes, for a bell which rings automatically as the engine proceeds along the street, and for a pair of candle lamps It is generally supplied of very highly ornamental appearance, and is constructed in four sizes, viz , for 30, 26, 20, and 16 men respectively

In brigades belonging to towns which have waterside premises it is very often advantageous to have a *floating* *fire engine* This will probably be beyond the means of most towns which have but a Volunteer Brigade, though there are several private brigades in this country which possess fire engines of this description There are several varieties of fire floats in general use, the differences being mainly those of arrangement of the motive power for pumping and propelling purposes Both petrol motors and steam engines have been successfully utilised in this connection The headings under which fire floats may be classed are three first, those in which the same engines are used for pumping and propelling, second, where separate engines are employed, and thirdly, floats for which no propeller is provided, this function being performed by the jets from the pumps when directed astern The first two types are most frequently used when the float is designed to serve the double purpose of salvage and fire protection, or where a large area has to be protected, while the jet propelled float which attains a speed of five or six miles an hour is adequate for the needs of private brigades and smaller waterside towns only The usual arrangement on floating fire engines is to draw water from each side of the vessel and to discharge through a monitor, which provides one large jet under mechanical control, or to a multiple delivery head to which hoses can be attached The pumps are from 1,000 gallons per minute capacity upwards The hull of the boat is made of steel, with a steel deck, and fore and aft are bulkheads which provide accommodation for large stores of hose

A typical fire float suitable for waterside towns is stationed at Newcastle, and belongs to Messrs Armstrong Whitworth The boat is 45 feet long, with 11 feet beam and 3 feet draught Steam is the motive power employed, and the boiler, which is of the usual quick steam raising water tube type, supplies steam to a two-cylinder vertical propelling engine driving a single screw, or to a 1,500 gallon per minute Greenwich steam pump Water can be drawn from each side of the boat and discharged either through a monitor or through a six-way delivery head, to which hose is attached. The float attains a maximum speed of nine miles an hour. The following appurtenances are also fitted; donkey pump, bilge pump, gas feed heater, and a five-ton capacity fresh water tank

In the equipment of fire floats, this country is much behind brigades on the Continent and other parts of the world, most of the largest and best floating fire engines built in this country are in commission abroad, in Italy, Mexico, Egypt, and other places

Manchester, however, possesses a float of the most powerful type, for service on the Ship Canal This boat was constructed by my firm in the year 1904, and has since rendered yeoman service The vessel is not only a fire float, but carries salvage pumps of enormous power, their capacity being over 22 tons of water per minute Thus sunken vessels may be raised, flooded compartments pumped out, and in cases of breakdown of dock pumps the boat is found a valuable auxiliary The hull, which is of steel, is 90 ft long, 23 ft beam, and draws only 3 ft of water It is divided internally by watertight bulkheads, the aft compartment being used as a hose store, two compartments amidships as engine room and boiler space respectively, and one forward as a capacious cabin

The boilers are two in number, of the locomotive type, each of 600 horse power, and each capable of driving the whole of the machinery on board These boilers are fed by two powerful pumps placed in the stokehold and arranged to take suction from the canal, or from tanks on board, and both can pump direct into boilers or through an exhaust steam heater placed in the engine room Both boilers are coated with composition to prevent radiation, and are fitted with safety valves, pressure gauges, water gauges, etc Copper steam pipes are led from boilers to engine room, valves being fitted so that either or both boilers may be used at once The boat is fitted with twin screws, driven by two vertical compound steam engines placed aft Each of these engines has double cylinders and slide valves, with link motion reversing gear The two fire pumps are of Merryweather's patent "Greenwich" horizontal pattern, and are each of a capacity of 2,000 gallons per minute. Each has double cylinders and gun-metal pumps, copper suction and delivery air vessels, and is fitted with a pair of flywheels The whole of the valves of each pump can be easily got at by removing covers without disconnecting the steam and water pipes, and the lubricating arrangements are very complete Suction can be taken from either or both sides of the boat, suitable strainer boxes being fitted, with sluice valves, enabling the two pumping engines to be worked together or separately The deliveries are all connected to a large copper main pipe which supplies three large monitors, each capable of throwing a 2½ inch solid jet, and also twelve outlets for hose, each with instantaneous couplings One monitor is placed forward, one amidships, and one aft Each has wheel and worm gear, enabling the jet to be thrown at any angle or in any desired direction Six of the hose outlets are placed forward and six aft, three on port and three on starboard side respectively

For salvage work two centrifugal pumps are fitted, each driven by a separate single cylinder high-speed steam engine Each pump will deliver 2,500 gallons per minute, and is connected to deck plates, on which are fixed suction and delivery bends Light steel and flexible rubber pipes are provided for suction, the delivery being directed overboard

Two steam bilge pumps are fitted with pipes and connections to all bilges All main steam engine exhausts are connected to a patent feed water heater in engine room, but any or all engines can exhaust into the funnels when required To communicate with engine room from deck a pair of registering telegraphs are fitted, as well as a speaking tube by helm Steering is by hand wheel, with geared tiller, and a hand tiller is also provided On deck is a cooking galley and lavatory. Two funnels are fitted, with hinges and counterweights, and the single mast forward is also arranged to lower for passing under bridges.

The speed of the boat is six to eight knots per hour, a greater rate of progression not being needed on the Ship Canal

CHAPTER X.

FIRE ESCAPES

THE FLY LADDER ESCAPE—THE OLD TELESCOPIC ESCAPE—THE SLIDING CARRIAGE ESCAPE—THE CURRICLE ESCAPE—ESCAPES ON THE CONTINENT—TURNTABLE ESCAPES—LADDERS AS WATER TOWERS—POMPIER LADDERS—AUXILIARY LADDERS—DOMESTIC FIRE ESCAPES

OBVIOUSLY, one of the most necessary of Fire Brigade appliances is a good fire escape There ought to be, in every town and every village where there are large buildings, a carriage escape, mounted upon wheels for ready transit The authorities of a town can hardly rid themselves of responsibility, if loss of life occurs through the absence of this indispensable appliance It costs little, and requires no very great amount of attention to keep it in order There are many different patterns of these machines made, but the principal are those known as the sliding carriage and curricle pattern, both of which are fitted with telescopic ladders

Prior to the introduction of telescopic escapes the old fly ladder pattern was the standard, but it has now been wholly superseded The weight of a 42-foot machine of this class was ten hundredweights The main ladder was made of fir, specially selected on account of its lightness, and the sides were strengthened with wire rope The fly ladder was of the same material, and similarly strengthened The main ladder had a shute of copper wire netting, with a canvas hammock at the bottom to receive the descending person, there was also a lengthening ladder that could be attached to the fly ladder if necessary

The fly ladder escape is now, however, a thing of the past, and the foregoing particulars are of historical interest only. It was liable to so many objections, that only the difficulty of making other escapes light enough for easy manipulation and transit, enabled it to retain its popularity for so long a period as it did During the later "eighties" the problem was grappled with by several makers with success, and by the year 1890 the fate of the fly ladder escape was sealed Machines in which the ladders were extended telescopically could be raised in a shorter time, and in much narrower streets, they were safer, and could be made to reach any part of a building, thus avoiding the risk that was entailed by the fly ladder escapes when the ladders could not be placed immediately under the windows These advantages, in spite of extra weight, procured the adoption of the telescopic machine in several brigades of the North many years before they became general either in that part of the country or elsewhere

In the old form of telescopic escape the main ladder, and the rising or telescopic ladder were made of white fir, as in the present day, this being free from resin, can be readily coated with a perfect durable paint This preparation not only covers the surface, but permeates the pores of the wood, which is rendered very durable and less liable to damage from water or weather, thereby preventing rot and decay Fire escapes, it may be mentioned, are more frequently condemned after a short service owing to decay arising from insufficient finish in the coating and preparation against exposure, than from actual wear and tear

A 50-foot machine weighed about nine cwt only, other sizes being proportionately light Owing to this, the telescopic escape could not only be used against buildings, but it could be made self-supporting by the aid of the legs, which, when not in use, were carried against the sides of the main ladder This arrangement was invaluable when the escape was employed to throw a jet through the upper windows of a building.

Most of the early telescopic escapes were liable to the fatal objection of the frequent sticking of the rising ladder, caused by the sliding system being imperfect, and being easily put out of order by exposure to undue heat or cold This defect was overcome by the following device The rising ladder was made to work between two pairs of rollers, spaced at short intervals There was, consequently, neither jambing nor undue strain, and, in the event of the ladder being warped by exposure, the sliding arrangement remained unaffected The escape could be worked on the side of a hill, as, owing to the roller arrangements referred to, it could be raised without wedging or jambing the sliding ladder A pair of small rollers, on an axle, were fixed on top of the sliding ladders, allowing the escape to glide up a building easily, and to run over projections without jerk or hindrance The elevating gear consisted of a steel-wire rope running over a large pulley on the top of main ladder, and wound over a hard wood drum turning in gun-metal bearings at bottom of main ladder By this means the machine could be raised to its full height in about 20 seconds

The carriage lever of the escape was arranged to fold up flat against the main ladder—a material advantage when the machine was worked in a narrow street, as it admitted of the passage of engine and men There was a tool box at the back of the machine This was of sufficient capacity to carry a thousand feet of hose, in addition to standpipes and branchpipes, nozzles, wrenches, turncocks' tools, felling axe, wedges, hand-pump, lamps, torch, lines, spanners, six buckets, and other gear

The advent of electric traction with overhead trolley wires saw the end of fire escapes, whether telescopic or otherwise, constructed to run in an upright position, and early in the '90's were produced the sliding carriage and curricle pattern escapes that are the standard hand-run types in vogue to-day Both of these types have telescopic ladders constructed after much the same pattern as the old vertical machines, but the ladders are run in an horizontal position With the sliding carriage pattern escape the ladders are arranged to slide in a frame work attached to the axle, and are held in a convenient position relative to the axle by means of a hand winding gear arranged on the back fly, the extending gear being also arranged on the back fly or else in a convenient position on the ladders themselves In the curricle pattern machines the ladders themselves are tipped up on a pivot fixed to the carriage, which is always kept horizontal, and which generally consists of a box for hose and gear The gear for manipulating the ladders is arranged generally in the same manner as in the sliding carriage pattern It will be obvious that with machines of this type the ladders can be pitched at any convenient angle so that the foot of the ladder can rest on the ground and the head on the building at which they are used, thus enabling extensive fore-courts to be bridged, and the ladders used in many positions that the older type machines could not negotiate

Owing to the comparatively low angles at which it is possible to use this type of ladder, some improved method of stiffening the sides, without at the same time unduly increasing the weight, became necessary, and accordingly I devised and patented the bow string girder ladder truss that is now almost invariably adopted for stiffening ladder sides

With the old pattern fire escapes it was the practice in large towns to station them at the street corners in the neighbourhood of the most serious risks, with a man on duty all night near by With the innovation of the horizontal running machines this practice was continued, and is still in vogue at the present day in several of our largest cities, viz , Manchester, Liverpool, and Birmingham But with the better equipment of street alarms connected to central stations, it was found that the horsed appliances from those stations were able to arrive at a fire, even though at a considerable distance, in most cases before the escape from the nearest point, and the great value of horsed fire escapes became apparent It had been the practice for many years in the London Fire Brigade to carry what was known as the "long ladders," that is, 80-foot hand-run escapes, on a large trolley on to which they were hauled by a windlass These combinations were heavy and inconvenient in many ways, and were soon greatly improved upon The improvements consisted in substituting a 50-foot sliding carriage escape for the older pattern ladders, and in designing a lighter and more convenient van on which the ladders were hauled by a rope tackle secured to the escape axle, which was run up an inclined plane in the rear of the van Provision was made on these vans for other first-aid appliances and hose, and these machines were installed throughout the whole of the London area for first-aid purposes

Many improvements have been made in this class of machine, mostly in the direction of cutting down weight and in simplifying means of attaching the escape to the carriage In many cases manual fire engines have been utilised quite successfully to carry an escape The curricle pattern escape has also been adapted for single horse draught by the addition of a pair of shafts, that could be easily detached when desired, and the provision of the necessary seats and foot-boards for driver and men

Another very convenient method of horsing a light escape consists in towing the escape itself behind a two-wheeled dog-cart having a swivel cradle on which the head of the escape is supported A number of machines of this pattern are in use, and this method is probably the best that could be devised for a single-horse apparatus

In continental cities and towns the general practice in regard to fire escapes has been to render the ladders entirely self-supporting when fully extended, and not to depend in any way for their stability on the building against which they are used These escapes are constructed more or less on the Curricle principle above referred to The necessary stability is, of course, only obtained by providing a base of sufficient size and weight to counteract the weight at the head of the ladder While these machines have certain advantages, they are necessarily extremely heavy and, moreover, do not lend themselves to adaption for horse draught They do not compare favourably for all-round purposes with our light pattern, which can always be made self-supporting by means of props permanently secured to the head of the main ladder

A very important class of fire escape, or perhaps better described as a fire ladder, is what is known as the "turntable" escape, which has ladders fixed to the rear of a four-wheeled appliance and arranged on a revolving platform or "turntable," so that on driving up to a building it can be slewed to either side of the carriage as required. This class of machine has been in general use in the United States and Canada for a number of years, and many years ago one was imported for the use of the London Fire Brigade It consisted of main and sliding ladders in two lengths reaching, when extended, to a height of about 80 feet The ladders were carried on a four-wheeled, horse-drawn truck, having such a long wheel base that it was necessary to steer the hind wheels in relation to the fore-carriage to enable the machine to be turned round in any but a very considerable area This machine was found totally unsuited for use in the narrow streets of the City of London and it was very quickly abandoned

On the continent of Europe, and principally in Germany, has been developed an altogether different type of machine that is capable of being used with a vehicle having a normal wheel base These machines have been well described as of the high fulcrum type, that is to say, the ladders are pivotted at a sufficient height above the carriage to allow of their being balanced on a fulcrum, so that a slightly preponderating weight in the rear such as can be applied by a couple of men hauling a winch gear, brings them quickly to an upright position.

Several of these machines were exhibited at the Earl's Court Fire Exhibition in 1903, and were certainly an eye-opener to some of us in regard to the ease with which the ladders were manipulated, and in their extreme stability when extended unsupported to heights of over 80 feet

The centre of gravity of these machines being so high there was some fear that great risks would be incurred by travelling at a high speed, but it was found that the weight of the machine—generally about four tons—quite precluded any idea of a dangerous speed being attained with a pair of horses

For this reason it is impossible to use these machines as first-aid appliances or as fire escapes proper, and I think that I can say without fear of contradiction that there is nothing on the Continents of Europe or America that for the purposes for which it is designed, viz , for saving life, can compare with the first-aid appliances that are in general use in this country

It is obvious that most of the types of ladders I have indicated above can be carried on automobile appliances I have mentioned this in a previous chapter But I should like to say here that the first automobile turntable escape that was ever made in this country, was designed and built by my firm The raising and extending mechanism for the ladders was operated by the same motor that was used for propelling the machine It was supplied to the Shanghai Fire Department and has proved a satisfactory appliance

The use of ladders as water towers, apart from the question of life saving, is a problem well worth consideration In attacking a fire that is confined to the upper storeys of lofty premises, it is important that a jet of water can be played on the actual seat of the fire, and this can only be done from a point of vantage afforded by the use of a ladder that can support itself, and that is sufficiently stable to resist the re-action of the water leaving the branch at high pressure It is here that the modern turntable escape is invaluable, and much good work has been done recently that would have been impossible apart from the use of this type of machine.

It is necessary, however, to exercise the greatest care when playing jets from a height of over 50 feet from the ground when the wind is high, accidents have been caused through want of sufficient precautions.

What is known as the "Pompier" type of ladder has recently come, to some extent, into use As its name indicates, it is of French origin, and was first used in Paris probably two centuries ago It was introduced into America in 1877, and nearly all of the members of the team that first exploited its capabilities lost their lives The "Pompier" Life-Saving Apparatus, nevertheless, quickly acquired popularity in the States, as a supplement to ordinary escapes for use in cases where it was impossible to utilise the latter The Apparatus consisted of a set of single beam scaling ladders, safety tube, grip sack, and life lines

"Pompier" scaling ladders are each from 16 to 18 feet long, and are made of light, pliable, strong wood, usually there is only one beam, and the rounds protrude about six inches on each side, but I am personally in favour of the type with two sides and a central fixed hook At the upper end of the ladder is a wrought iron hook, about three feet long, jagged for the purpose of reaching over window sills and holding on to them. The hook can be driven through a closed shutter if necessary Folding joints, whether in the hooks or in the ladders themselves, are a source of danger, although they certainly facilitate stowage The material of these ladders should be most carefully selected, as the minimum amount of material is necessarily only allowable if the weight is to be kept down to a workable limit Well-seasoned English ash is as trustworthy a timber as can be used, and great care should be taken to periodically test the ladders to twice their working load if nasty accidents are to be avoided

The safety tube is a long canvas chute, about ten feet in circumference, with openings at various parts, which are kept closed by straps passing through a loop alternately on each side These openings are not intended for entering the tube, but for taking people out when the height of the building renders the use of only a part of the chute necessary

The grip sack is a piece of strong canvas, for use principally as a jumping-sheet, and the life-lines are lengths of rope by means of which, with the assistance of their snaphooks, the members of a properly organised corps are able to make descents from very high buildings

The belt, which every man has, is made of leather and canvas, about six inches wide, and is sufficiently strong to sustain the weight of several men Attached to the belt by a very strong leather strap is a large snaphook of wrought iron, this is for the purpose of snapping on to the rung of the ladder and so securing the wearer against loss of balance, at the same time leaving both his hands free It also serves the purpose before-mentioned of acting as a brake to the life-line, so that by taking two or three turns of the rope round the hook, and firmly securing it at the top, the wearer can descend entirely unassisted, and even bring a man down on his shoulders A description of the working of these appliances will be found in the Chapter upon saving life The "Pompier" ladder was introduced into the London Fire Brigade in 1903 under the excellent name of "emergency ladder," and has been found useful in cases of exceptional difficulty

In every brigade, however small, there should be, in addition to the carriage fire escape, a few lengths of scaling ladder These are usually made 6 ft. 6 in long and are fitted with joints to enable one length to be coupled on to any other length of the set Six or seven lengths connected together can be used with safety. As a rule, two lengths are carried with each manual engine When more than this number are used together it is well that the ladder to be at the top should be fitted with a pair of light wheels, by means of which it will glide easily up the sides of buildings as the other ladders are connected below.

As regards domestic fire escapes, their name is legion, and I can safely say that more than ninety per cent. of the inventions brought to my notice, relate to some form of domestic escape They are not firemen's tools, but I mention them because fire brigade officers are often desired to give advice about them Of all the devices that have ever been placed on the market the canvas chute escape is by far the safest as a domestic escape

There are, however, certain conditions that must be insisted on if this form of escape is to be relied upon. The material must be of the best Navy quality, and must not be expected to last for ever It is necessarily of a thin texture, and like all other materials made from flax will rot in course of time, especially if not frequently aired Periodical use by members of the household is essential, and inspection by a properly qualified professional fireman is most desirable

Canvas chutes should never be fitted to ladder escapes, they present too much surface to the wind to be safe and they consequently invite disaster

For a means of escape that can be carried about in an ordinary kit-bag, the " fluffy-rope " is probably the most convenient It is light and strong and with a stout snap-hook can be rapidly secured to a bedstead The construction of the rope renders it easy to descend without injury to the hands, and is preferable to any form of knotted rope

CHAPTER XI

UNIFORM

CLOTHING AN INDEX TO CHARACTER—VARYING APPEARANCES OF FIREMEN'S DRESS—TUNICS—HELMETS—BOOTS—ORNAMENT—N. F. B. U. UNIFORM—PRECAUTIONS AGAINST COLD

THE subject of firemen's clothing is one that cannot be passed over without notice. It is a universally accepted fact that a man's apparel is in a certain way an index to his character. This is equally true of a fire brigade. Running the eye down the ranks at a competition or a procession in which a number of different brigades appeared some twenty years ago, the spectator could not but be struck with the great diversity of appearance amongst those who were taking part in the proceedings. There was the shabby uniform of old fashioned cut, which had manifestly not been renewed for many years. There was the "cheap and nasty," badly-made and of chameleon tints. There was the gaudy cloth of the swell brigade, prominent at fêtes and festivals, but of small reputation for firemanship in its native town. And there was the good, substantially well-made uniform, seldom missed amongst the best companies of our working volunteers. The National Fire Brigades Union has done much good work amongst Volunteer Brigades, and, to secure the comparative uniformity of dress which exists to-day, has not been the least important of its achievements.

It cannot be said in the case of a fire brigade that appearance is unimportant. Appearance goes for a very great deal in the case of those brigades, at all events, which depend upon public subscription for their support The general public cannot possibly be induced to support to an adequate extent a number of ill-dressed, slip-shod individuals, whilst, on the other hand, they will usually gladly contribute towards the maintenance of a brigade, the appearance of which is a credit to itself, and consequently an honour to the town It is therefore essential to have all the uniform of good make and good quality.

A cheap common tunic or helmet, even if it can be made to look well in the first instance, does not long retain the handsome glow of youth, it may be a thing of beauty at first, but it is anything but a joy for ever—it soon shews by shrinkage and change of colour that it is part of a cheap lot

The tunic usually recommended for volunteers is very similar in appearance to the London Brigade pattern tunic, and is made of stout, blue, water-proof cloth

A fireman's tunic should have brass buttons, and an officer's white metal, the latter will also have epaulettes

In a brigade officered by a superintendent, deputy-superintendent, foreman and engineer, the superintendent would have pair of white metal epaulettes, the deputy-superintendent a single white metal epaulette on his right shoulder, the foreman a pair of brass epaulettes, and the engineer a single brass epaulette

In addition to a tunic a complete set of uniform includes —Helmet, cloth trousers, belt, axe, spanner, pouch, and pocket line, undress cap and boots The helmet may be of either brass or leather The first is usually chosen for appearance, and the second for comfort in working

There is no doubt a brass helmet looks better, and it is now made very strong and at the same time wonderfully light, but it cannot be made so light as a leather helmet, and consequently the latter is still preferred by many brigades The trousers are usually of blue cloth to match the tunics, and the boots of grained leather and of sufficient length to reach above the calf but below the knee

It is desirable to provide an undress suit consisting of a double or single-breasted jacket, usually of blue serge, less heavy than the blue cloth tunic The ordinary blue cloth trousers, provided with the full dress suit, can, of course, be worn with this serge jacket without producing any inharmonious effect, but, when funds permit, a separate pair of trousers of the same serge as the jacket can be added This undress suit would be worn when it is desired to distinguish the Brigade as a body on occasions not requiring the full uniform, such as social gatherings, and, in the case of volunteer brigades, when the men are on duty at the station

Another not very expensive addition is a blue dungaree or white duck suit, consisting of a jacket, cut on somewhat similar lines to the undress jacket, together with a pair of overall trousers made sufficiently loose to slip over the ordinary trousers This suit is very handy for wearing at practice drills and when cleaning up the fire station or the gear after return from a fire or demonstration, and saves injuring or disfiguring the ordinary clothes Special waterproof macintoshes, capes, and leggings are also valuable, particularly for use by branchmen when standing in one place for any length of time playing a jet in one position, with perhaps the wind blowing back a drenching spray, and such articles as rubber gloves and boots of similar material are necessary when electrical fires have to be dealt with

A little ornament is allowable in connection with the buttons These might be made to add very much to the appearance of the uniform , the common design is a crossed hatchet with a helmet or torch between, but sometimes a brigade prefers its own initials or a special device peculiar to itself , in such instances a special die is necessary, and the cost is somewhat higher than would otherwise be the case. Beyond this, much ornament upon dress intended to be worn during actual work is to be deprecated

The following is the uniform prescribed by the National Fire Brigades Union for their members —

CHIEF OFFICER'S FULL DRESS

Tunic —Blue beaver cloth, double-breasted, box pleat behind, pockets in front skirt, 3-inch scarlet patches on collar, body and sleeves lined woollen serge, skirt twilled Italian cloth, 12 N F B U white metal buttons, 2 white metal badges, 1½ inches from collar end, and double white metal epaulettes

Trousers —Blue beaver cloth

Helmet —White metal, M F B pattern *Boots* —Wellingtons

Belts —Black leather *Gloves* —Tan leather

CHIEF OFFICER'S UNDRESS

Blue cloth, double-breasted reefer jacket with five white metal N F B U buttons, pair of plated or white metal double epaulettes attached on shoulders, silver wire lace Navy rings, one on each arm, and two N F B U buttons on cuff, three pockets outside, one inside

Or Regulation Norfolk or Regulation Patrol Jacket may be worn, with double epaulettes, and two badges on the collar, in the proper metal

Trousers —Blue vicuna or wool serge

Cap —Staff cap, with large silver-plated or white metal badge in front and two silver pipings above and below band

Gloves —Tan leather *Boots* —Ordinary black *Tie* —Black

SECOND AND THIRD OFFICER'S FULL DRESS AND UNDRESS

Same as Chief Officer's, but yellow metal throughout instead of white metal, and yellow piping on cap

DISTRICT AND BRIGADE SURGEONS.

Chief Officer's uniform, but with silver shoulder cord instead of epaulettes, also pouch instead of axe, but he will on all occasions be recognised when in the Undress Uniform.

Ambulance Department —Chief and other officers same as Brigade Surgeons

HON MEMBERS

Same pattern as the Undress uniform above described according to the status of the Member, but without epaulettes, in place thereof cord straps to be worn on the shoulders In place of the ordinary Union badge on collar and cap, the Hon Member's badge to be worn

The metal of buttons, straps, badges, etc , to be according to the status of the member corresponding to the active rank

FIREMAN'S FULL DRESS

Tunic —Blue beaver cloth, double-breasted, box pleat behind, pockets in front skirt, 3-inch scarlet patches on collar, body and sleeves lined woollen serge, skirt twilled Italian cloth, 12 N F B U brass buttons, two small brass badges, 1½ inches from collar end No buttons on back

Trousers —Blue beaver cloth and scarlet piping

Helmet —Brass M F B pattern (weight not less than 2 lbs)

Boots —Wellingtons, to be worn with trousers turned over the tops Weight not less than 4 lbs

Black leather belt, axe and spanner

FIREMAN'S UNDRESS

Blue cloth, double-breasted reefer jacket, five large N F B U brass buttons, and two small N F B U buttons at cuff, two pockets outside and one inside *Trousers* — Blue cloth, with scarlet piping

Cap —Nelson pattern, with scarlet piping, with large badge and name scroll in front Boots and tie black.

In connection with the subject of clothing it is important to remember that in winter time firemen often suffer considerably from cold One of the chief objects in order to prevent injury from exposure to cold is to protect the chest and back, and next to keep the hands and feet warm. To protect the hands it is important to prevent the pulse or wrist from becoming chilled. Here the arteries which supply the hand with blood come near the surface, and if the wrist is exposed the hand is liable to be quickly numbed It is better to have the fingers bare if the wrist is well protected than to have a bare wrist and the hand warmly covered To keep the feet warm, the following method has been recommended —Take two bunches of common curled hair as large as the closed fist of the person whose feet are to be kept warm A little liberality in the quantity will do no harm Pull this out and make a pad large enough to cover the sole of the foot from heel to toe It must be pulled out light and free from lumps and bunches Put one of these pads in each sock next the foot The quantity of hair must depend, to some extent, on the looseness of the shoe But whether much or little is used, the object is to cover the sole of the foot only with hair, and prevent the foot from coming in contact with the sock The sides and top will then take care of themselves If curled hair is not to be had, that which can be combed from the mane and tail of the horse, or cut or pulled from the necks and heads of cattle or other animals will answer When the shoe or boot is so tight that no space remains for the hair, remove the sock and place the hair on the bottom of the shoe

CHAPTER XII

HOSE REELS AND HOSE

HOSE REEL FIRE BRIGADES—COMPARISON BETWEEN THE ADVANTAGES OF HOSE REELS AND HOSE TRUCKS—THE HYDRAULIC HOSE REEL—THE BEST HOSE IS NOT NECESSARILY THAT WHICH STANDS THE HIGHEST PRESSURE — ADVANTAGES AND DISADVANTAGES OF LEATHER, RUBBER-LINED, CANVAS, AND INDIA-RUBBER HOSE—BAD POLICY OF PURCHASING LOW-PRICED HOSE—DESCRIPTION OF PROPERLY AND IMPROPERLY MADE LEATHER HOSE—CANVAS HOSE, ITS COMPOSITION AND METHOD OF MANUFACTURE—HAND WEAVING AND MACHINE WEAVING—DETERIORATION BY MILDEW—OAK BARK TANNING—REPAIRS TO HOSE

FIRE BRIGADES in some small towns or country villages which have a good water supply in every part, and which make no pretence of protecting surrounding districts, can perform their work, under ordinary circumstances, without the assistance of motor, steamer, or manual For reasons given elsewhere, however, this course is not to be recommended, but where it is adopted, a very simple equipment is all that is necessary A hose reel or cart, together with a quantity of hose of whatever kind may be decided upon, the branchpipes, nozzles, wrenches, sets of tools, and appliances mentioned in the steam and manual lists as being necessary in actual fire extinguishing, are all that need be obtained The object of the reel on wheels is to enable a considerable quantity of hose to be kept with the couplings of the various lengths united, and ready for easy transit to a distance Its superiority to a truck where large quantities have to be laid down is obvious By connecting the end to the engine or standpipe the reel has merely to be drawn forward, and the hose unwinds itself There is no delay in coupling up, and the reel can be moved more rapidly and with less labour than the coils can be carried. The work can also be done by a less number of men On the other hand, when a small quantity of hose only is to be used, the truck will sometimes be found more convenient; and if the hose has to be laid in positions where the reel cannot be taken, it will be necessary first to unwind the hose and then drag it to the required spot, this involves more labour than would be necessary were the hose carried in coils from a truck The balance of advantages, however, in towns where the hydrants are not very close together is in favour of the reel For use with hose of small bore, such as is employed in conjunction with chemical engines, the "hydraulic hose reel" is a most useful appliance In this type of reel one end of the hose is permanently connected to the axle of reel, which is hollow and has suitable couplings at one end This contrivance enables the hose to be used without unwinding more than is actually necessary

With regard to the kind of hose to be adopted, not only for use in the above way but also by brigades which have a steamer or manual, there is a great deal to be said I am, in fact, asked many hundreds of times in the course of every year which sort I recommend, and it may, therefore, be well to devote some few pages to a consideration of the subject

It cannot be too strongly insisted upon that the real test of good hose is not the number of pounds pressure per square inch it will bear, but its capacity for enduring rough work and wear, and the time it will last under this discipline There is no fact about hose more frequently lost sight of than this If it will bear a pressure of 400 or 500 lbs per square inch when first used, it is assumed that the quality must be good Now, a pressure of 200 lbs per square inch is the maximum which is reached at a fire, and hose that will stand this pressure for several years is to be preferred to that which will stand 500 lbs when new, and no pounds at all six months afterwards I am often consulted with reference to hose supposed to be good because it at first stood a heavy pressure, which has caused disappointment by its subsequent rapid failure The fact is that various classes of hose are suited for various purposes, some for high pressure, some for lasting wear Fire Brigades do not, as a rule, require hose for extraordinarily high pressures, but they do require it to be trustworthy and durable This is one reason in favour of leather hose for fire brigade general purposes where the quantity of hose necessary is not too great to allow of leather being used, for though leather hose is not able to bear so great a bursting pressure as hose made of other materials, it is much more durable than either plain canvas or canvas with the well-known inner coating of india-rubber

Leather hose can be kept in good order by dressing, can be repaired when cut or injured, and, if properly cared for, will last forty or fifty years

For work indoors canvas rubber inlined hose is to be preferred to either leather or canvas, the rubber lining being watertight, there is no percolation through the pores of the material (an *advantage* in outdoor work, when the hose has to be carried across burning materials or hot ashes), it is much more cleanly to handle, and will not spoil the drawing-room carpet if it is forced to come into contact with it Another excellence is its lightness, which enables it to be used in longer lengths than leather Its interior surface being smooth, a free flow of water is allowed, with friction reduced to a minimum, and in cases where a high pressure is absolutely necessary this hose is of much service It can be made to stand 500 lbs or 600 lbs per square inch without bursting

It is necessary, however, in speaking of this class of hose, to add a word of warning There is a great deal of very inferior rubber-lined hose made and sold, its outside is not pure flax, but wholly or partly jute, and the lining is made of very inferior rubber I am repeatedly shewn samples of this hose, which have not lasted in use twelve months

The virtues and vices of the ordinary plain canvas hose are too well known to need much comment It is not water-tight like the rubber-lined hose, nor durable like the leather It can be made to stand an excellent pressure when necessary, but it is easily damaged, especially by sharp stones and by being dragged over walls, etc , and when damaged is not to be repaired except by a sewn joint, or a ferrule which prevents its being properly coiled and also itself cuts the hose at each end of the shank It is, however, exceedingly light and pliable, and its first cost is lower than that of any other kind

India-rubber hose has almost gone out of use for fire brigade work As costly as leather, it has neither its reliability, nor durability, nor its facility of repair

The bad policy of purchasing *any* kind of hose of inferior quality on account of a difference, even a large difference, in first cost, is apparent when these two reasons are taken into consideration —First, that because of its greater durability good hose will prove itself to be in reality the cheaper, but principally because any question of cost whatever bears no proportion in importance to the interests involved Looking at the matter from a fireman's point of view, the success of a brigade in extinguishing fires must always largely depend upon the quality of its hose, and, looking at it from a Municipal point of view, the hose makers' account, whether it totals to £100 or £200, is not to be thought of, when hundreds of thousands or millions of pounds' worth of property is at stake The disasters which have occurred through this part of the fire brigade apparatus having failed are far too numerous for recapitulation An instance was brought to my notice some years ago, where, by the bursting of a single length, a direct damage of over £15,000 was occasioned

Leather hose should be made from the best oak-bark tanned English butts, cut from steer or heifer hides of good even growth, well dressed with dubbin, or a mixture of fish oil and Russian tallow The hides should be free from defects of any sort—flesh-cuts, warble holes, or any blemish The strips should be cut out of the hind part of the butt, which, as being firmest, is the most suited for the purpose All the soft parts about the belly, neck, and shoulders should be rigorously excluded As a rule no more than four strips, wide enough to make a steam fire engine full-sized delivery pipe, can be obtained from one butt Braidwood fixes the minimum length of each strip at four feet, and Captain Shaw the maximum at four feet nine inches The length should on all occasions vary between these two dimensions The utmost care should be used in making up the pipe, the strips should be cut exactly to gauge, the punching and riveting should be accurately and carefully done, and all sharp edges on rivets or washers avoided, otherwise considerable damage may occur to the hose

If leather hose be made of such materials and in this manner it is obvious that it cannot be made to sell at two shillings per foot, yet I believe it is possible to buy leather hose at two shillings per foot in London to-day It may be interesting to know, to quote a homely phrase, "how it is made for the money." In the first place, then, the butts are neither of English growth, nor are they tanned with bark, and the dressing is not performed with pure fish oil and Russian tallow, but with common oil and tallow, which have been clarified or refined with acid By these means a cheap raw material is obtained, which, to the uninitiated, looks as well as the best, but, unfortunately, any virtue that might originally have been in the hide, is speedily taken out of it by the dressing The leather contains an element of self-destruction in the acid, the corrosive action of which causes it speedily to perish

A further saving, valuable to the manufacturer, but disastrous to the purchaser, is also effected in the making up of the hose Instead of the sound and firm portions of the hide only being selected, the whole hide—belly, shoulder and all—is cut up into strips When made up, the hose, in consequence, is of very unequal strength throughout, the loose parts soon stretch, thereby increasing the diameter of the pipe in these places, and causing the strain here to be greater than in any part of the hose, and its failure, of course, exactly at the moment when everything depends upon its not failing, is the inevitable result

Whether hose of this sort fails first from the badness of the "make up," or the inherent self-destroying properties of the leather it is manufactured from, of course, depends upon the amount of work it gets If it is used two or three times a month the former will be the case, on the other hand, if it lies about a country fire engine station or gentleman's house, and has water through it but seldom, it will yield first to the destructive action of the acid

Canvas hose has almost entirely replaced leather for fire brigade purposes, mainly owing to the various points of excellence before enumerated, and because, owing to the great quantities now used in the larger brigades, both first cost and facility in handling have become factors of prime importance Its lightness is its greatest advantage, because it allows long lengths to be laid down without joints, and, therefore, diminishes the time necessary for a brigade to get to work at a fire Its cleanliness is appreciated, of course, by men who have to handle it, and keep it in order. As far as cost is concerned it is in reality not a cheap hose to use; if bought at a low price it is certain to be worthless, and even good hose of the class has a very short life when compared with the life of that made of leather, and it cannot be effectively repaired when burst, as leather hose easily may be

To those who have only a slight acquaintance with the subject, all canvas hose appears very much the same, there is, however, a great difference between various kinds Some are made of pure flax of the highest quality, and a very small quantity is still woven by hand The cost of hose of this class is very little less than half that of good leather hose Other kinds are made of much inferior flax. In this hose the selvage is the weakest part, but if pure flax, a good weaver, and a good loom work together, an article is produced that none but an expert could distinguish from hand woven hose, and I am afraid that some of the canvas hose that is sold as hand woven has nevertheless been through a power loom The quality of the raw material is more important than the question of hand or power weaving, and it is here that the great difference of price arises The cheapest makes of hose are made from hemp yarn, and should be carefully avoided

A great mistake is made, as I observed, if it is thought that the true test of the value of hose is the pressure it will bear at first Government departments especially, and many fire brigade purchasing committees stipulate that the hose they are buying should bear a pressure of 300 lbs or 400 lbs to the square inch They ought to be informed that common canvas hose of hemp and jute will often stand even as high a pressure as this at first, although in a very short time afterwards it will break and crack It is unwise to subject even the best hose to a strain much higher than the heaviest it will have to bear in actual use, although it may come through the trial successfullv, it may still be permanently injured If hose will bear a pressure of 150 to 200 lbs per square inch, with a margin for contingencies, for half-a-dozen years or more, it must incontestibly be of greater value to a fire brigade than other hose which will stand 400 lbs now, but will be useless after a few months' service It is, however, very difficult to get purchasers to see this fact, which, to manufacturers and experienced firemen, is so verv manifest

The greatest disadvantage attached to the use of canvas hose of every kind and quality is its liability to depreciation by rot or mildew This is very well understood by all who have anything to do with its use or manufacture, but I question if the cause is generally known In fact, the nature of mould or mildew was for a long time very obscure, and our ablest scientists, after a great deal of investigation, could not agree upon the subject Some considered it to be a kind of chemical action, or slow combination with oxygen, continually going on in the material, while others attributed it to the action of extremely minute insects It is now almost universally admitted, however, to be a growth of a vegetable nature, originating in invisible spores or cells, which are constantly floating in the atmosphere When these spores are caught in a soil congenial to their growth, they grow into a fungus, which we call mildew These spores or cells are so infinitesimal as to be invisible, even with the aid of microscopes of the highest power, but Professor Tyndall, in the course of his investigations into floating matter in the air, demonstrated, by means of a powerful beam of light, that they are always present in large numbers in the ordinary atmosphere we breathe and live in

Before these spores can develop into fungoid growths they must come into contact with material in which the necessary conditions are present, as they always are in damp cotton, linen, and other organic substances

The problem which manufacturers have to solve before they can produce a rot-proof canvas hose is simplified by the knowledge that if they can remove these conditions, damage by mildew will be impossible The task they have to perform is to render the material, without damaging it, sterile to the germs constantly deposited upon it by the atmosphere There are several preservative compounds with which canvas hose can be treated, that effectively prevent the growth of these fungi, but, unfortunately, at the same time, they are the occasion of considerable injury to the fibre I introduced and in 1883 patented a process, by means of which canvas hose may be preserved, the fibre, at the same time, escaping injury The hose is treated with a preparation of oak bark and solutions containing a large quantity of tannic acid, and is not only rendered reasonably mildew-proof, but the material itself is made stronger and more flexible, and its life is, therefore, greatly prolonged

When a length of hose is in need of repairs it should always be sent up to the makers for the purpose Although saddlers, harness-makers, and other tradesmen may be able, on an emergency, to patch a length of hose, they are certainly not able to make it permanently serviceable To really repair a length of hose, tools are necessary which are only found at the establishments of fire hose manufacturers, and of a few other firms who require the use of hydraulic apparatus in the course of their business

In the first place, hose must be properly tested, which is done by hydraulic power, once before the repairs are executed, in order to ascertain what faults and defects exist, and once after repairs, to make certain that the length is sound and good and in a condition to do its duty

Leather hose is placed in the hands of men whose entire business it is to repair such piping It is thoroughly examined, the seams ripped up, and new rivets inserted if necessary, the cross joints are tightened, or new ones made as may be required, or perhaps a joint of the hose is taken entirely out and a new one inserted in its place The exact cutting of the leather strip to size, the punching of the rivet holes, and fitting the new piece to the old are matters of great nicety, and a considerable amount of practice is necessary to make the workman perfect This is also true even of the apparently simple business of "riveting-up," a too heavy blow sends the rivet head too far into the material and cuts it, a too light blow leaves the joint in a leaky state After going through this discipline, the hose is carefully washed and partially dried by being suspended from one of its ends to drain It is then dressed with the best prepared hose oil, which is gently forced from the inside by means of a pressure pump into the pores of the material, this feeds the leather, and materially conduces to the length of life of the hose.

Canvas hose is tested in the same way as leather, but in regard to repairs less can be accomplished If there is only a small hole it can be closed by a little careful treatment, but if there is a burst or a large hole the faulty part must be cut out and the ends bound together upon a metal ferrule, or a sewn joint can be made by a skilled worker The ferrule has to be fitted with great care and judgment, otherwise the ends of the shank will cut the canvas the first time the length is used

Rubber-lined canvas hose is tested and repaired much in the same way as canvas, but it is sometimes possible to put a patch upon it of the same material as the hose itself by a special preparation of india-rubber solution

There are many little matters in connection with repairing hose which greatly affect the utility of the length when brought out for active service, for instance, the hand loops must be put on in exactly the proper position, or they will be very unhandy in hauling the hose about and in suspending it from ladders The couplings must be fastened in such a fashion as to allow the lugs to be exactly horizontal when a length is coiled, otherwise there will be much awkwardness in running it out, and the men will be liable to injure their hands, also, unless the couplings are properly bound in, they will probably "draw" under a moderate pressure They should be riveted to the hose, and the copper wire tightly bound on by means of a suitable machine, the hose having been previously eyeletted and protected from injury by the heel of the coupling by means of leather guards bound on Unless this is carefully attended to, the shank of the screw is certain to cut the material, and so render the length of the hose useless until the coupling has been taken out and bound properly in

CHAPTER XIII.

FIRE CALLS AND ALARMS

IMPORTANCE OF EFFICIENT FIRE ALARMS—OPEN AND CLOSED CIRCUIT SYSTEMS—SAUNDERS AND BROWN—STUART AND MOORE—GENERAL ELECTRIC—GAMEWELL—SIEMENS—TELEPHONE SYSTEM—ELECTRIC SIREN—FIRE BELLS—MAROONS

THE system of fire alarms for calling a brigade to the scene of a fire is a most important part of any complete scheme for the fire protection of a town or city Thirty years ago excellent pumps were made, and the work performed by them, once they arrived at a fire, was little inferior to that of modern appliances Most of the improvements of recent years have been in the direction of shortening the period of time which must necessarily elapse from the discovery of an outbreak of fire to the arrival of the fire-fighting machines It would seem then, that the vast improvements made in fire alarms during recent years are in some measure responsible for the high state of efficiency to which the modern fire engine has been brought, for it is apparent that if the fire brigade does not receive a call within a short period of the outbreak of a fire, a matter of a short time longer on the road loses some of its importance

The modern fire alarm system, with alarm posts placed at suitable points in different parts of a town, allows of an almost instantaneous call, or at least of one in as short a time as a messenger can be sent to the nearest alarm post Twenty-five years ago such systems were looked upon in England with an unbelieving eye, and were pronounced as untrustworthy, always out of order at the critical moment, etc At the time, this may not have been altogether unjustified, but at the present day such a criticism would be a confession of ignorance.

There are now several systems of this kind, which have stood the test of years. I do not propose to discuss their merits and demerits; there are difficulties to be overcome in all of them, and they have been overcome with success in entirely different ways Of the five systems which I am about to describe I will only say that I have recently had the opportunity of inspecting stations fitted up with all of them, and in every case the working has been pronounced as satisfactory, and I have usually been told that "the system we have here licks all the others hollow." There is no doubt that they all do their work, and that with fire alarms, as with other items of engineering practice, fad and fancy play a part The only advice I would give to those who have to make a choice of a fire alarm system is, when you have to choose between several systems which you are satisfied can be relied upon, go for the simplest one

Modern fire alarms work either on the "open" or the "closed" circuit In open circuit systems, each post is separately connected to the station and no current passes while the system is at rest, on the alarm being given the circuit is completed by earthing the wire, and current is drawn from the battery In closed circuit systems all the posts are in series on the same wire and a current flows continuously round, the signal is given to the station by breaking the circuit, when a train of clockwork is brought into action

In all open circuit systems it will be seen that as the alarm is given by earthing the wire, some means have to be provided for detecting a false alarm, which would be given by an accidental earth, such as a tree touching the wire In closed circuit systems an earth merely entails a loss of current, and false alarms can only be given by a breakage in the wire, but should this occur the whole of the alarm posts on that circuit will be out of action unless means are provided for temporarily converting it into two closed circuits with earth return until such time as repairs can be effected More wiring is needed in open circuit systems, as each post is separately connected to the station instead of from post to post, but this is counterbalanced by the fact that the closed circuit entails a continual expense for current even though the alarm is not used A point which has to be considered in connection with closed circuit systems only, is the possibility of two alarms coming in simultaneously and so interfering with one another This has been successfully provided for; the point does not occur with the open circuit, as each post is entirely independent of all the rest In open circuit systems provision must be made for testing the lines from time to time The ammeter on the switchboard of the closed circuit shews at a glance if the line is in order, but this advantage is counterbalanced by the fact that there is clockwork in the alarm post heads, which must be frequently inspected I have mentioned these points in order to shew what difficulties have to be overcome, and also that each system has advantages, I will now proceed to go into detail

One of the oldest fire alarm systems is the *Saunders and Brown* It works on open circuit, each post having a separate wire to the station The false alarm danger from accidental earths, tree contacts, etc , is guarded against by placing in series with the alarm bell a milliammeter which reads up to 250 When the alarm is genuine the needle of the instrument immediately rushes over to 250, should the alarm be due to accidental earth, the contact is usually bad and of high resistance, so that a low, fluctuating, or gradually increasing reading, is observed on the ammeter It is then a matter for the discretion of the watch officer, whether he turns out or not. In practice it is found that there are few turn outs for alarms from this cause This system has been used for many years by the London Brigade, who are at present engaged in making some additions to it, one of which is to give a reply signal to the person giving the alarm As formerly arranged the system worked as follows —

In each post head is a knob which can be operated after the small glass window has been broken, when this is pulled the alarm is sounded at the station There is also in the post head a small bell push and a telephone mouthpiece and jack, but this is only used for testing purposes, and is not meant for the general public Simultaneously with the ringing of the alarm at the station a white disc appears on an indicator panel opposite the name or number of the post from which the alarm has been sent. The watch officer, immediately on hearing the alarm, and being satisfied that it is genuine, pulls down a switch close at hand, which rings all the house bells and operates the station lights, and makes a note of the time at which the call was received There is, of course, the usual house bell panel, allowing of adjustment and any individual man's bell may be cut out of the circuit, so that he is not called when the above mentioned switch is operated There is a testing panel with a telephone jack for each alarm post With the aid of these, telephonic communication is possible with the station when testing the alarms The station is called by the bell push in the post head previously alluded to, the plug of a portable telephone is then inserted by the tester in a jack in the post head, and by the watch officer in the corresponding jack on the testing panel

The *General Electric* is another open circuit system The apparatus is all on one panel At the top is the bell Underneath this is the master switch operating the bell calls in the men's houses, while below this is a row of "individual" switches for the men, with two positions, "off" and "on," thus allowing a man to be left out of a "brigade call" if it is desired, also underneath each switch is a bell push, allowing of an individual call to each man In the next row is the "annunciator," which consists of a row of numbers each covered by a hinged flap, the flap falling shews the number of the alarm post from which the call has been sent, underneath each number is a jack, into which the answering plug, which hangs beside the annunciator, is inserted The remainder of the apparatus consists of "control bell," control indicator, "buzzer," telephone magneto generator for giving a telephone call, telephone plug, and any additional telephone jacks that may be required for communication with public offices, brigade officers, police, etc , the functions of these are described later on

In each alarm post is a handle which earths the wire when pulled, thus completing the circuit and ringing the alarm bell at the fire station, actuating the annunciator, and ringing a small bell in the post head, the handle will not return to its place as it is held up by a catch, which is released by the person who puts in the new glass The watch officer at the station immediately replaces the annunciator, inserts the "answering plug" in the appropriate jack, and lifts the telephone from its place, when the "buzzer" works on the switchboard, denoting that the call is genuine, and the person who gave the alarm hears the bell in the post head stop ringing, thus informing him that his call has been received He then calls the brigade by operating the master switch, and next withdraws the answering plug and puts the control plug in its place, this stops the alarm bell and deflects the control indicator —a galvanometer needle—to the "on" side The control plug is normally in a jack on the side of the control or relay bell, the purpose of this bell is to announce the fact that the pull handle in the alarm post head has been replaced, and when this has been done the control indicator goes to "off" and the bell rings, it is then the duty of the watch officer to replace the control plug in its normal position.

The lines can be individually tested from the station by putting in the answering plug and turning the magneto generator, when the "buzzer" works if everything is in order In the alarm head is a push and telephone jack, and with the aid of a portable telephone, a man at the post may talk to the station, or, using the station as a telephone exchange, may be "put through" to another post, any public office, the police station, or anywhere else with which the station has telephonic communication A lightning arrester is provided in each alarm post

The safeguard from false alarms due to accidental earths is the buzzer When the bell rings at the station it may be due to one of three things, genuine alarm, someone wanting to speak, or an accidental earth, but the buzzer will not work unless the fire alarm handle has been pulled

The *Stuart and Moore* system is another of the open circuit type A distinctive feature of this system is the intermittent ring which denotes a "true" fire alarm—a false alarm due to accidental earth resulting in a continuous ring In addition to this there is a visual alarm, also of an intermittent nature To give a call a person breaks the glass of the alarm post head and pulls the handle The intermittent signal is then given, no matter how or how many times the handle is pulled The call is indicated in the two ways previously mentioned and also on an indicator panel which gives the number and position of the alarm post from which the call was sent On the receipt of a call the time is noted, the brigade called by pulling a single switch, and a reply key on the switchboard is pressed, thus giving a reply signal —the ringing of a bell in the alarm post—to the caller The absence of this signal denotes that the call has not been received, and the caller thus knows that the post is out of order and can proceed at once to the next

There is an automatic fault detector in connection with this system, which tests one line every ten seconds.

When a fault is detected a bell rings, the dropping of an indicator shews the number of the line, and a lamp illuminates one of three discs labelled "break," "contact" and "earth" respectively

Should a man desire to speak from the post the plug of a portable receiver is placed in the jack This gives a continuous ring at the station and the number of the post is indicated, so that the watch officer, knowing it is not a fire alarm, depresses his speaking key and answers

It is sometimes convenient to arrange for the fire alarms to be used as police telephone calls as well When this is catered for a two-way switch is placed in the post head and labelled "Police" and "Fire Brigade" According to the position of the switch so the Police or Brigade are called, in the former case an automatic switching apparatus at the fire station doing all that is necessary In whatever position the switch is left the fire alarm is always available, even if a "police" conversation is in progress at the time

The "*Gamewell*" fire alarm system works on the "closed" circuit principle Its home is the United States of America, but it has made a fair amount of progress in this country The system consists of one or more circuits, in which are placed in series not more than five and twenty alarm posts Where more than one circuit is employed a duplicating machine serves the purpose of linking up the circuits, receiving signals from any of the alarm posts, and automatically repeating them and shewing them on all the indicator boxes In the event of signals from two circuits being received simultaneously, it does not mix them up, but hands on one after the other

There are several types of alarm head, but I shall only describe one, which is in use in this country A key is obtained by breaking a glass, the door can then be opened and a lever depressed, this action releasing a train of clockwork which gives the alarm signal four times at intervals of ten seconds. The alarm is indicated in three different ways, on the indicator box, a gong sounds the number, and a clock tape machine punches the number on the tape, and stamps the time four separate times. On the receipt of a call the watch officer operates a switch which gives a brigade call; at night time this is done automatically by switching in a relay which both calls the brigade and operates the station lights.

On the switchboard at the station are mounted lightning arresters, ammeters for testing, battery switches, and telephone jacks. The ammeters shew that the line is in order; should a line break the ammeter reading falls to zero and a bell announces the fact. The batteries are preferably of the accumulator type, and in duplicate. Charging is controlled from the main switchboard, and should the voltage become low, a bell warns the attendant that it is time to change over and re-charge. Should there be no electric power supply in the neighbourhood the system may be run on Daniell's cells. In the street alarm head there is a bell which serves the double purpose of a reply signal to a person calling the brigade, and also for informing the brigade that a second call has been received; for so long as the door remains open all alarms may be received at a street head as well as at the Station, and a man is left standing at the post for this purpose. A man testing a street alarm post can communicate with the Station either by Morse Code with a key in the alarm head or by telephone, in the former case the message being recorded on the clock machine.

The "Gamewell" system being essentially electro-mechanical, is sometimes made in a comprehensive way to do most of the work of the brigade except putting the fire out. It is constructed to open the station doors, operate lights, open sliding pole trap doors, etc. This sort of thing is not much in favour in England, but some most ingenious installations of the kind may be seen in America.

"*Siemens*" systems are also of the closed circuit type. The two systems which they supply, and which are in extensive use on the Continent, are called the "*dial indicator*" and the "*Morse safety*" The two systems only vary in the nature of the receiving apparatus. In the "*dial indicator*" the name gives the clue to its distinctive feature In the alarm post head is placed a handle, which can be pulled after the glass has been broken The pulling of the handle rings the alarm bell and releases a train of clockwork in the post, by which a number of impulses are given to a needle, which moves over a dial indicator with numbers on it, until it comes opposite the number corresponding to the post from which the alarm has been sent the replacing of the indicator to its normal position stops the alarm bell ringing The pulling of the handle in the post head sets a loud bell ringing in the head itself, calling the attention of the public, thus diminishing the danger of wilful false alarms, also it opens a door at the top of the post and exposes for use a telephone, by means of which the caller can speak to the watch officer and give him verbal directions The clockwork in the post head is sufficient to give three alarms It is the duty of the man who puts in a new glass to wind it up each time Should he forget twice the alarm is still in working order, but when the alarm goes for the third time the post is earthed and the earth detector bell ringing calls attention to the fact that this requires attention

The system working on the closed circuit, an earth is no matter of great importance, merely resulting in a waste of current, but, nevertheless, an earth detector is provided, taking the form of a milliammeter with a relay and bell

The beauty of the two systems mentioned above is that even a break will not give a false alarm, as the receiving apparatus is not put into operation, nor does the alarm ring until at least four impulses have been received, whereas a break only gives a single impulse A break is, however, indicated in another way, a small bell rings and a red disc appears bearing the number of the circuit in which the break has occurred, calling attention to the fact Even then the circuit in which the break has occurred need not be out of action, the posts on each side of the break are automatically earthed, and the middle point of the battery is earthed by closing a switch, thus converting the broken current into two circuits with earth return

Not more than twenty numbers are placed on a single dial Should there be more than twenty alarms in the system, two or more circuits are used, with a dial indicator to each, but in the Morse safety system as many as 30 or 40 may be placed in a single circuit

As I said, the "*Morse safety*" system only varies in the type of receiving instrument Two clock tape machines receive the alarms, write the number of the post, and stamp the time of the call three times In the ordinary way both machines would record a call, but should another call come at the same time, even though it had previously started to record the first call, one of the machines would immediately begin to record the second, while the other went on with the first, no "hanging up" is necessary

I should like to point out that the above brief remarks must not be taken to include the whole scope of any one of the systems. They indicate what I believe to be the general practice For example, I have only mentioned telephones for the public use in one case, because it is recommended by the inventors of that system as their standard It would be equally possible to provide them on any of the others in which telephonic communication with the station is provided for the use of inspectors; this is not often done, because people are frequently too agitated to use them, undoubtedly verbal assistance and directions are of much value if they can be obtained Similarly, the time recording machines are not by any means sacred to closed circuit systems, but are not found in the standard open circuit systems because of the electro-mechanical principle involved, the absence of which the open circuit systems claim as an advantage

The cost of an alarm post system frequently runs to £2,000 or £4,000 for a fairly large town In smaller places, where the expense of an alarm post system is not justified, and, indeed, in such a large city as Coventry until this present year, the public telephone service or messengers have served the purpose of calling the fire brigade From the station the men are called with the usual system of individual switches governed by a master switch which gives a brigade call The cost of such an installation is about £1 per hundred yards of wiring if the wires are carried from chimney to chimney, or slightly more if posts are employed, about twelve shillings each for bells and five pounds for a station switchboard

A useful alarm for smaller villages is the electric siren This takes the form of an enclosed weatherproof electric motor coupled direct to a loud siren enclosed in a weatherproof casing The whole should be mounted on a long pole sufficiently high to clear surrounding buildings, with the switch enclosed in a glass case near the bottom

Another, but more primitive sort of alarm, is the fire bell, which usually succeeds in attracting a crowd to the scene, but frequently fails to rouse the firemen for whom it is exclusively intended In small villages, however, it is likely this means of sounding an alarm will still continue many years If it is decided to fit up a fire bell, it should not be done without careful reference to the locality in which it is to be fixed In a hilly locality a bell will not be heard half so far as on low ground It will be heard a great deal further along a valley than over the hills at the sides A bell should not be hung lower than the surrounding buildings or trees, because any obstruction of the sound prevents its free passage to a distance When hung stationary, and struck or tolled, bells will not be heard, as a rule, half as far as when swung. The swinging motion throws up the mouth of the bell, and not only carries the sound off, but imparts to it a richness that is always absent when the bell is at rest and struck A great deal is to be gained by ringing a bell properly, throwing the mouth well up, and not lazily jingling it It is not physical strength that is required so much as "getting the knack" of catching the rope just right, particularly on the second "down pull" The windows in the tower should be as wide open as possible, and the tower ceiled just above the windows

There are also other fire calls which are still used Some Volunteer Brigades still retain the system of verbal messages, and some adhere to the firing of a maroon The first system is certain, though slow, but the maroon system has few points of excellence Some time is necessary for it to be brought into action, because on the discovery of a fire the proper person must be found, and he must proceed to the spot where the maroons are kept. With all these types of alarms there is no security that the attention of the proper persons will be attracted, and on the other hand they are certain to attract a large crowd of people who are not concerned in the matter, but who may get in the way and impede the firemen in their work

CHAPTER XIV

SOME SMALLER APPLIANCES

APPARATUS FOR BRIGADES IN AGRICULTURAL DISTRICTS—DIVIDING BREECHINGS—COLLECTING BREECHINGS—RESPIRATORS—LAMPS, OIL, ACETYLENE, AND ELECTRIC—CHEMICAL EXTINCTORS—PETROL FIRES—HOSE COUPLINGS—SPRAY NOZZLES

A FEW remarks on some of the more important of the smaller fire appliances are necessary here

In brigades which protect agricultural districts, the steamer or manual (a steamer is doubly valuable to brigades of this sort owing to the impossibility of sometimes obtaining manual labour for pumping at country fires) should be provided with a few special tools for dealing with fires in rickyards Three or four haycutters in sheaths should be carried on the engine, and there ought to be rick cloths and tarpaulins, which, when saturated with water, are of great service for dealing with ricks on fire An ordinary hot bed thermometer with a steel spike about four feet long should be carried for the purpose of ascertaining the temperature at the inside of ricks

One of the most valuable of the smaller appliances in general fire brigade use is the dividing breeching, which, as everyone knows, is an appliance for dividing a single stream of water into two streams or more

The breeching ordinarily employed consists of one female and two male couplings, the former is screwed to the hose containing the undivided stream, and the latter to the female connections of the other lengths A breeching of a different pattern is arranged with two rack shut-off valves, by means of which one stream can be instantaneously shut off if it is found desirable, without this valve arrangement it is, of course, necessary to stop working, disconnect the breeching, and re-connect the hose afresh There is another breeching with a different arrangement of valves to effect the same purpose It is fitted with a three-way plug cock, which can be opened at option to both the inlet and two outlets, the inlet and one outlet, or it may be altogether shut

The dividing breeching in experienced hands is a most valuable piece of fire apparatus It may be used for a variety of purposes, for instance, when the fire is at a distance from the water supply, and the quantity of hose on the ground is limited, a single stretch of hose may be taken to within a short distance of the fire, and there divided into two, so as to allow the flames to be kept in check, notwithstanding they may be spreading in more than one direction In a case like this, if the distance is, say, 500 feet, about 550 feet of hose and the breeching will furnish two streams, thus enabling 450 feet of additional hose, which would otherwise be necessary to give two jets, to be dispensed with The breeching is, therefore, of great service, and if the brigade dealing with the fire does not happen to possess enough hose for the two lines they will have cause especially to appreciate this little article

Sometimes a dividing breeching and a collecting breeching may be used wth advantage to change a single stream into two at the engine or hydrant end, and to re-unite them again at the branchpipe end, this is for the purpose of avoiding excessive loss of pressure by friction in the hose A branchpipe with two inlets has been designed, by means of which the two streams are united into one without a collecting breeching The same object is effected, although somewhat less perfectly, with a branchpipe screwed direct on to the male end of the collecting breeching, it is, however, usual to have a short length of hose intervening, as this ensures a steadier jet

Those who know little of the work of fire brigades would anticipate that one of the most constantly used of all the appliances would be the respirator, experience however, teaches that this is not the case In many brigades these articles are not kept at all, and in still more they are practically unused, the great resort of the fireman, when he has to face smoke and noxious gases or heat, seems to be a wet handkerchief Why this is so I have never quite been able to understand There are numerous patterns of smoke respirators, and other contrivances for the same object, varying in price from a few shillings to £20 or £30 each Probably the great objection to these articles is the uncomfortable feeling which those wearing them are certain to experience before they become accustomed to their use

The most simple form of respirator consists of a rubber or aluminium casing, which contains a pad of cotton wool or a small sponge, which is usually damped with a solution of vinegar This apparatus covers the mouth and nose and is held in position by loops or straps passing round the ears and the back of the head, an automatic valve allows the egress of the used air

Another class of respirator arranges for a supply of air to be forced through a line of rubber hose by means of an air pump or hand bellows to a smoke helmet, and it is this kind of apparatus which will be most useful to Volunteer Brigades There are various patterns of smoke helmets commonly employed In one of these a headpiece with eyepieces forms the top part of a leather jacket, and the "joint" is made by means of a leather belt round the waist In another pattern used by the London and other brigades the helmet has a thin leather cape, which can be tucked underneath the tunic, and the front of the helmet can be unhooked and removed at will. In a third pattern no attempt at an air-tight contrivance is made, and the helmet is of the nature of a shield over the eyes, nose and mouth, the fresh air being delivered at the top and blown downwards, thus keeping the eyes clear of smoke and the air inside the helmet reasonably pure, the advantage of this is that should through any accident the air supply become kinked, the fireman is at any rate no worse off than he would be if he had no respirator at all

Respirators of this kind are sometimes provided with telephonic communication between the fireman in the helmet and the man at the pump, and most complete portable steam plants providing for electric light as well are in use at Liverpool and Manchester In these machines a quick steam-raising water-tube boiler supplies steam to a single-cylinder vertical engine suspended between side frames Beside this is a single barrel air pump, driven by a clutch from the crankshaft, which supplies four valves fixed on the side frame Over the fore-carriage is a dynamo, to supply eight 32-c p lamps, driven by a belt from the flywheel of the engine Six reels are provided, each holding 200 feet of flexible insulated cable for the lamps, and a large cage in the middle of the machine carries six 60-foot lengths of flexible metallic air hose in coils In front, under the driver's footboard, is a box holding batteries for the telephone service The smoke helmets are made of leather, and inside are fitted telephone receivers and transmitters, wires being led through the air box to air valves, from whence wires are carried to a switchboard, so as to enable the officer in charge to communicate with his men working in the darkness and smoke

In a third type of respiratory apparatus the fireman wears a smoke helmet, but carries his supply of air with him, either in the form of compressed oxygen or liquid air Such respirators are more used in colliery rescue work than by fire brigades, the conditions of the former quite precluding the possibility of an air supply through pipes Apart from this, these systems have no advantages over the " two man " pattern of respirator

I am afraid that the possibility of using a liquid air respirator is quite outside the field of Volunteer Brigades

Liquid air is expensive to buy and cannot be stored for any length of time, as an extremely low temperature as well as high pressure is necessary for its preservation When liquid air respirators are used at collieries a liquid air generating plant is usually installed in connection with them

The oxygen respirator is a more possible appliance Oxygen under high pressure is carried in one or more cylinders strapped on the back A regulating valve on the cylinder, within easy reach of the wearer, regulates the supply of air to an " expansion bag " in front An alkaline preparation is carried in this bag, which absorbs the exhaled carbonic acid gas, leaving the nitrogen to circulate again, thus maintaining a natural air for breathing The mask or helmet is usually of rubber, with glass eye-pieces, and the inlet and outlet fittings have automatic valves to ensure a proper circulation

With the advent of motor fire engines, the subject of lamps for fire engines has become of much greater importance than it was previously With the high speeds which are nowadays attained by motor fire engines on the road, a lamp which will only throw a light a few feet is absolutely useless, and paraffin and colza have been discarded in favour of acetylene and electricity as light producers for these high-speed machines

The former, however, are usually good enough for horsed appliances, so that a few remarks about them, before passing on to the more up-to-date fittings, will not be out of place The well-known London Brigade pattern head and hand lamps and the improved " Barton " burner are too well known to need description The combination of these two probably forms the best oil lamp for fire brigade purposes

The most important thing about oil lamps is that they should have constant attention, or else they are a continual source of nuisance Wicks should be of the correct size—slightly smaller than the mouth of the burner when dry—and suitable for the kind of oil to be burnt; a paraffin wick will not give satisfactory results with colza It should be remembered that a wick has a very short life, if the lamp is used, it may be good for three weeks, but if not, wicks should be changed every fortnight, as after this time they lose much of their "drawing" power When a lamp is extinguished the crust should be wiped off with a cloth while the lamp is warm and the wick then kept below the mouth of the burner until required for further usage When the lamp is lighted the wick should not be raised too high, or else it will smoke badly in a little while, a short time should be allowed for the lamp to gain its full strength Above all, keep the reflectors bright and the air holes free from dirt and soot

In regard to lamps for motor fire engines, the choice falls between several systems of burning acetylene gas, or in the application of electricity

Acetylene gas can be applied to a lamp in three ways by using it in a compressed or dissolved form carried in a steel cylinder, by generating it with calcium carbide and water in a separate generator supplying one or more lamps, or by a generator formed in the lamp itself

The first form is certainly the most convenient for quick lighting up, and an arrangement can easily be made for igniting the gas from the dash by means of an electric spark worked by the ignition gear of a petrol machine, or by a separate coil and accumulator on a horsed or steam propelled machine The dissolved acetylene outfit consists of a small steel cylinder, complete with a pressure-gauge and all the necessary valves, contained in a small wooden case, which can be carried on the footboard or in any other convenient place, but it is necessary to point out that although fairly easy to obtain in this country, a supply could not be relied upon for "out-of-the-way" districts abroad

There are several satisfactory generators for acetylene gas at present on the market These may be arranged in a convenient position for access, preferably on one of the footboards, and can be obtained of sufficient size to supply sufficient gas for a number of powerful lamps The principal disadvantage of this system in fire brigade work is the impossibility of detaching the lamps from the vehicle for use as hand lamps, and therefore self-contained lamps, each having separate generators, although entailing more work for cleaning and keeping in order, are perhaps the most generally useful as far as the employment of calcium carbide as an illuminant is concerned

Self-contained lamps are mostly capable of giving light at full power for about six hours continuously If properly designed, the output of gas can be regulated so that a single charge can generally be relied upon to carry through an ordinary working job, and if a further supply is desired the generator can be quickly recharged by a fresh supply of carbide and a little water

For all-round convenience, however, it will be probably found that electricity forms the most convenient form of illumination for fire brigade machines An electric head-lamp that will give as useful a light as acetylene necessitates the provision of current at a pressure of at least twelve volts and lamps of twelve-rated candle-power Lamps of this power, with properly designed reflectors and lenses, and especially those with metallic filament bulbs, compare very favourably with acetylene, and have been found from actual practice to give a light quite powerful enough for fast driving on a dark night

The necessary current can be supplied from a portable accumulator having a capacity of about sixty ampere hours, or by a small dynamo, suitably wound to give automatically a constant voltage, driven off the transmission shaft of the machine by a belt and pulley An accumulator of the necessary capacity only measures 18in by 6in by

8in., and can be easily carried on the footboard in a weatherproof box.

Electric head-lamps of this type cannot, of course, be used as hand-lamps, but electric hand-lamps, provided with a small four-volt accumulator, that will give a light at least equal to an oil-lamp, can be easily carried separately for use when required. Such lamps are not unduly heavy, and are, of course, quite unaffected by smoke in a basement.

In the opinion of the writer, a set of motor fire engine lamps that would be found most convenient for all-round purposes would consist of:—

Two 12-volt 12-c.p. head-lamps set as low down and as wide apart as possible in front of the machine. A large-size self-contained acetylene lamp fixed on a swivel bracket on the edge of the dash. Two ordinary paraffin side-lights for use by hand if required. An electric tail-lamp and electric engine-lamps, all specially arranged so that the electric bulbs could be substituted by oil-burners should emergency call for their use. An electric hand-lamp with separate accumulator. A 12-volt 60 ampere hour accumulator made up of 3-4 volt sets, each in celluloid cases, the whole being carried in a suitable tray with a stout leather strap, together with an exactly duplicate set. The tail and engine lamps need only have 4-volt bulbs, suitably connected to the smaller units of the accumulator. A spare set of bulbs should always be carried, and a spare charge of calcium carbide.

The fitting of the necessary brackets for carrying lamps of whatever pattern used is an extremely important matter. They should only be made of forged iron or steel, with as few welds as possible. The arms joining the lamp-bracket proper to the foot for bolting to the framework of the machine should either be kept very short or very stout, otherwise the vibration due to their want of stability seriously affects the whole construction of the lamp, whatever type is used.

When set-screws are used for screwing the lamps to their brackets a good lock-nut should also be fitted to prevent slacking back from vibration

The setting of the brackets with due relation to the direction of the axis of the lamp is one of the utmost importance, as on this depends the whole efficiency of their illuminating power from the driver's point of view If the ray of light is thrown down on the ground close to the engine it is too late to pull up when an obstacle in the road is observed within their limited area, whereas if the lamps are set at too high an angle the sides of the road and not the road itself is illuminated

The lamp brackets should therefore be set so as to throw a ray of light on to the road about 100 feet ahead of the machine, and at the same time slightly upwards so as to light up effectively the kerbs or ditches on each side

From time to time officers of brigades will have brought to their notice many contrivances for dosing and physicing the fire fiend with powders and lotions, instead of resolutely putting him out with a good drench of water. It is only natural that some easier and more rapidly effectual method of extinguishing fires than the water process should be sought, and it has been sought persistently during the last two hundred years It would be too much to say that there has been no result at all from all this labour, but it is certain that the gain has not been an equivalent to the value of the time and work which have been bestowed in obtaining it All we have is a number of portable appliances capable of extinguishing, by means of water impregnated with various heavy incombustible gases, a small conflagration, perhaps a little better than a moderate quantity of unchemicalised water would do, the history of the attempts to deal with large fires by any chemical expedients is a history of the completest failures possible, and all the world over large fires are still extinguished by means of plain water only, projected by mechanical, manual, or gravitational force

My own opinion is that the value of these appliances almost entirely consists in their portability Doubtless, carbonic acid gas, ammonia, and, still more, sulphur di-oxide are able fire fighters if only they reach the seat of the fire *in bulk*, this is a scientific fact beyond dispute, but no practical means has yet been devised of attaining this end The well-known hand "Kemik" in which sulphuric acid is released into a solution of carbonate of soda, has frequently proved effective, but its fire extinguishing properties are almost entirely due to the water, the chief purpose of the chemicals being to generate the pressure needed to throw a jet, thus making a more portable, but certainly not more efficient, first aid extinguisher than a hand pump The hand grenade which could be thrown into the heart of a fire was an honest attempt to utilise the fire extinguishing properties of the heavy gases, which I previously mentioned, but the trouble here is that if a fire is large enough to have a "heart" it is certainly outside the scope of a hand grenade, and if not it will be sheer accident if the grenade discharges its gases in a suitable place

The number of what I may call "quack" chemical inventions, as opposed to those just referred to, introduced at various times to put out fires is legion, and still every year sees others brought forward, perhaps a patent applied for, and then dropped, yielding a little pecuniary return for a time if well advertised, but practically valueless—a touching testimony this to the dogged obstinacy of humanity, which refuses to acknowledge the impossibility of success, notwithstanding the accumulating evidence of thousands of failures These inventions are frequently in the form of a powder, and the method usually adopted in order to push these devices is to arrange for a public trial and exhibition Upon these occasions a wooden shed or some other structure is artfully built, and is smeared with petroleum or something of the kind When ignited, the oil, of course, raises a great flame, which is as easily extinguished, comparatively, as a candle is blown out, the wood itself is never allowed to get alight If a piece of timber be taken up at the conclusion of one of the experiments it will be found that it is merely charred on the surface, the interior being quite untouched These facts are mentioned in order that those who have little experience in the matter may not be led astray, and give away their reputation by endorsing some invention of the hour as "the most valuable fire extinguisher ever used," and one "certain to supersede all others" It is not unusual for the promoters of these experiments to invite the presence of the local Fire Brigade superintendent, who, if he is induced to endorse the latest quack specific for extinguishing fires, is, as a rule, sorry he has done so after his next conversation with a more experienced fireman

There are, however, just two species of fire which it is futile to fight with water, or with chemicals for that matter, namely, electric arcs and fires of petrol or other like highly inflammable fluids To deal with these there is nothing like earth or sand From their very nature fires from these causes will, at the outset at least, be of an extremely local description, and a few shovelfuls of earth or sand quickly applied will totally exclude the air and render further combustion impossible. A most useful appliance to have in places where such fires are likely to occur is a small sand truck They are frequently seen at garages, petrol stores, electric theatres, and power stations, and consist of a box of stout sheet galvanised steel mounted on three cast iron rubber tyred wheels, and holding about six cwt of sand The front fork is fitted in a swivelling fork with drag-handle attached The sand can be taken from the top, or can be shovelled into a bucket from the side, in which a sliding panel is fitted When the sliding panel is raised, a peg is inserted in a hole in the side of the truck and prevents the panel from dropping down A bucket is usually carried on a bracket at the back, and two strong wooden spades on brackets at the sides

The couplings used in the hose form an important part of the apparatus, because the time in which a stream can be brought to bear upon the fire very largely depends upon the time spent in laying down the hose, especially when there is a great distance between the engine or hydrant and the fire A great deal of time is also occupied at a large fire in changing lengths of hose Consequently the screw coupling has been, in many brigades, superseded by various devices, by means of which a joint can be made more rapidly than by this means On the whole, however, the coupling still most extensively used, both in this country and the Colonies, is the old London Brigade pattern V-thread screw, which was introduced into London by Braidwood, and was also adopted by various Government Departments It has always been a popular coupling While not remarkable for any feature of special excellence, it is connected with moderate rapidity, is not very easily injured, and makes a thoroughly secure joint

About thirty years ago, however, this coupling was discarded by the London Brigade, and one having a round thread and only two threads to the inch was introduced It is connected much more rapidly than the V coupling, is less easily damaged, and will make a joint with any thickness of washer, but it is, necessarily, not quite so secure

In Scotland the bayonet joint is very largely used, this also has some advantages The parts are entered with certainty, and a quarter turn is sufficient to tighten up It is open to the objection that unless great care is paid to the leather washer the joint is defective If the washer is not sufficiently stout the lugs turn round without making a tight joint, and leakage is inevitable If it is too stout the lugs do not turn sufficiently to hold the connection securely when the hose is moved

Many brigades have adopted the "instantaneous" couplings; these are chiefly remarkable for the facility and celerity with which the two parts can be joined In one, the male has simply to be pushed into the socket end without any rotation, and the joint is at once perfected The joint is obtained, not by force applied to any parts, but by a peculiarly formed india-rubber washer placed in a recess, which is so acted upon by the pressure of water that the greater the pressure the more the washer is forced out Before the washer is acted upon by the pressure, it is only necessary to ensure the spring catches holding the two parts of the coupling together, and, when the pressure is on, the catches being in order, it is not possible for the hose to be disconnected, even the small amount of pressure caused by hose being taken up into a moderately high building will prevent the joints upon the ground being uncoupled until the pressure is relieved

Another type of coupling is the "hermaphrodite," which, as its name denotes, is the same at both ends of the hose These couplings are by far the most popular on the Continent Some hermaphrodite couplings are coupled by parallel faced lugs on sliding collars, and no joint is made until the water arrives, when two U-shaped india-rubber washers are expanded and their faces pressed together In other types the lugs on the sliding collars have inclined faces, and the rotation of these in opposite directions pulls the ends of the hose together and the joint is made with thin leather washers

The question of aluminium versus gunmetal for couplings is the old problem of weight and strength Is the saving in weight worth the loss of strength? If we are to take our answer from general practice, the answer is no; but, of course, there may be special circumstances which will reverse this decision in particular cases An aluminium coupling only weighs a third of the weight of one which is made of gunmetal, but it is brittle, and has in consequence to receive much more gentle treatment.

Amongst the nozzles carried on a fire engine it is advisable to have one or two spray or spreading nozzles, of which there are many excellent kinds to be obtained, and a few shut-off nozzles, by means of which the stream can be lessened in size or altogether shut off without the engine being stopped or the hydrant pressure shut down This latter, however, must not be used unless either the pump or the hose is fitted with a relief valve, or the sudden shutting off of the stream will cause damage either to one or the other There is probably no better spray nozzle than the "Murphy" With it a spray, a solid stream, or a spray and stream together can be obtained. It has a cylindrical chamber or body, with a flat bottom and a removable cover at the top In this chamber a hollow plug revolves, constructed in such a manner that by turning a lever secured to the top the water may be guided either through an opening giving a solid jet, or another giving a circular spray 40 feet in diameter, or both together The mouth of the nozzle is bell-shaped, with an opening in the centre for the solid stream, and an annular space concentric with this opening for the spray

Another popular spreading device consists of a fan-shaped flap, which by depressing a lever on the end of the branchpipe is forced on to the jet about two inches after it leaves the nozzle This throws the water in the arc of a circle instead of a solid stream, normally a spring holds the flap out of action

CHAPTER XV

FIRE BRIGADE HORSES

EVERY BRIGADE SHOULD HAVE HORSES AT READY DISPOSAL—CHOOSING FIRE HORSES—POINTS TO BE SOUGHT—CHIEF LESHURE'S DESCRIPTION OF A GOOD FIRE HORSE—FOOD AND CARE OF HORSES—SHOEING FOR SLIPPERY WEATHER

EVERY brigade that is not exclusively a motor brigade should have, if possible, horses at its disposal, ready by day or night for instant service If horses have to be sought upon the receipt of a call, the inevitable delay that occurs is most detrimental to the brigade's efficiency The question, like many others of importance to brigades, is mainly one of expense, and in many cases I am aware this desirable object cannot be obtained If a job-master is to keep a pair of horses in constant readiness, he must, of course, be paid for doing so , the expenditure is quite a legitimate one, but being impossible in many of the smaller towns, the advantage must be foregone like others which depend upon pecuniary means which a brigade does not possess

Where a brigade is able to afford horses of its own, much care may profitably be expended upon their selection

In choosing horses for fire service it is always as well to have the advice of a veterinary surgeon It should, however, be remembered that horses must not only be fairly sound animals, but should also be suitable for the special work they have to do A horse may be suitable for use with a private carriage, and, at the same time, be a poor animal to draw, either alone or matched with another, a steamer or manual, and our drivers know very well how difficult it is to procure an animal adapted to the service which is required in a paid fire department The necessary qualities of a good fire-horse may be summed up in a few words It should be active, prompt, docile, endowed with an instinct scarcely distinguishable from intelligence, free from vice and have at the same time the necessary qualifications to make it serviceable

In selecting a horse for regular service in a fire department, the following points should always be sought

A compact well-knit frame is of prime importance Long oblique shoulders denote speed Should the reader have any difficulty in deciding what oblique shoulders are, he may get some assistance from putting a saddle on a horse, setting it, of course, in the right place, and then looking at the horse from a side view If the horse has good shoulders the stirrup leather will hang down at some distance behind the forelegs, but if, on the other hand, the shoulders are upright, the stirrups will be comparatively close to the forelegs, and, on mountains, the rider would find himself sitting over the legs instead of behind them Care must also be taken to have the shoulder clothed with muscle The chest must be broad, narrow horses may, perhaps, be fast, but they have not the necessary endurance for fire service The arm must be long and of course muscular, the knee wide, the ' cannon bone " (*i e* the bone between the knee and the fetlock) short, and the legs flat with strong back sinews The feet should be moderately wide, and have good strong heels, or they will not stand the battering about that falls to the lot of the most carefully driven fire-horse

The hind legs are most important, for they are the seat of the propelling power The thigh should be long and muscular, the hock well bent, and not bending inwards —when the horse is said to be "cow-hocked"—nor outwardly like a bandy-legged man The shank bone should be well guarded by strong sinews and the pasterns moderately long and by no means straight Horses with straight, short pasterns are ill-adapted to stand hard work

So far then as the body is concerned, strong legs, wide hips, depth of girth, and a short back, or more properly a back not too long, are all important, let it be remembered that, beyond a certain point, development of any extraordinary strength is accompanied by a loss of speed But whatever number of good points a fire-horse may have, they will be utterly valueless unless it is sound in the bargain There are two kinds of soundness, practical and legal A horse is not legally sound, that is to say he is legally unsound, if there is any structural alteration however slight, in any part of the body, though it may not unfit him in any degree for the immediate performance of his duties To be legally sound, a horse must be in the same state—barring growth and increase of strength, as when foaled—and each reader may determine for himself how often this can be found in a lot of one hundred To be practically sound a horse must have nothing the matter with him that is likely to interfere with the duties he will be required to fulfil, and he can be in this condition without being legally sound

As to wind and eyes, however, the fire-horse should be legally and absolutely sound The usual method of testing the wind, by punching the horse or pinching the windpipe, is not satisfactory, the horse should be galloped

The amateur will do well to get the best veterinary surgeon within reach to examine the eyes of the horse he contemplates buying Cataract, in its incipient stage, is so difficult to discern as to escape the notice of everyone but the most practised person As to the feet and legs, the buyer will have to rest satisfied with an assurance that his horse is practically sound, for of really sound horses, there are not two in a hundred

In a paper read by Chief Leshure, of the Springfield (Massachusetts) Fire Department, the author made some valuable remarks in regard to points of excellence in fire-horses, which are well worthy of re-production here He says :—

"The head should be small, the forehead broad and flat, the eye kindly, strong and fiery, yet gentle looking, the ears thin, fine, and often erect, the nostrils circular, dilated, and red on the inside, the lips soft, thin, and hairless, the cheeks well marked The neck of a good horse will form an arch or agreeable curve, from the poll to the withers It will be of proportionate length, and will progressively increase in breadth as it approaches the chest If the canal of the jugular vein is deep, and the windpipe full and prominent below it, we have a sign of good wind The shoulder should be strong and thick, but moderately slanted, with an elevated wither, so that the steed can step lightly and freely, sufficient strength and weight being retained for the draught required of him The fore-legs, when viewed laterally, should descend in a straight line from the bottom of the shoulder, but when seen in front they ought to incline gently forward The projection of bone called the elbow, which can be easily felt at the back of the top of what is commonly known as the arm, demands special attention The elbow should be thrown far back from the front of the arm The knee should be flat and very broad The leg should be thin when viewed in front, but its side must be broad

"Horses that are fit for the fire service will have thick wiry sinews, distinctly felt as separate cords running from the arm to the fetlock The fetlock is large, and yet not out of proportion to the other parts, no joint is too large whose form is prominently displayed, and whose ligaments can be felt Again, the postern will have a downward inclination to the foot, not too oblique for strength, nor too short and straight for the animal to be sure-footed We now come to a part on whose good condition depends largely the value of the whole animal—the feet Of course, the model horse has feet perfectly proportioned to his size; and it is as serious a fault for the feet to be too large as too small Most of the lameness, and many of the diseases of the feet that trouble our horses, might be obviated by intelligent shoeing A horse that is properly shod will travel with perfect ease immediately on leaving the forge, and statements to the contrary are usually nothing more than excuses for bad workmanship If the hoof is in an active and growing condition, it should be shod every three or four weeks, and too great importance cannot be attached to the perfect adjustment of the shoe When we come to the outward appearance of the animal, a full and prominent breast is one of the most notable features The ribs stand out in a graceful curve, the 'barrel' is round and capacious, and the back is straight The loins should be observed with especial care, for narrow loins indicate even greater weakness than a hollow back For whatever purpose a horse is selected, he should have well-shaped, long, and powerful hindquarters, here is the fulcrum by which the animal's chief efforts are made The haunches may lack the plumpness of the full quarter, but the stifle projects far forward, and has a perceptible irregularity of the surface, the thighs are long, thick, and muscular The hock may be taken as an indication of the horse's strength, as most of the projecting muscles are attached to it, and the power is proportioned generally to its size

"In regard to the care of a horse, regular exercise is especially necessary for horses belonging to the fire department When the horse is brought in sweating he should be thoroughly dried and cleaned In general, physicing is to be deprecated, save by a regular veterinary surgeon, but with good air, good light, exercise, and proper food, there will not be much demand for his services Hay should be given sparingly, as it is not strengthening enough for the service, and will be made more palatable by a sprinkling of salt water The main dependence should be oats—old, heavy, dry, and sweet In hasty driving the horses should be allowed to take the gait that suits them best, the bridle open, and the head and neck free from checks and curbs

Those persons who still use such barbarities 'for style,' would do well not to complain, as they often do, that our horses are strained or abused in going to fires on a gallop "

Whilst upon the subject of horses, it may be as well to mention that much may be done to prevent their falling in the streets, especially in slippery weather, by paying a little attention to the shoeing An admirable form of shoe consists simply of a narrow rim of steel, nailed, or rather, pinned on to the outer edge of the hoof, thus allowing the "frog" of the foot to grow naturally, and form a non-slipping pad or cushion, giving the horse a firm tread upon any smooth surface, such as asphalte, etc

These shoes are so successful, that even in severe frosts, when the roads and streets are covered with ice, and other vehicles are stopped in their progress, engines drawn by horses so shod are able to proceed to fires without the slightest fear or risk of the horses slipping down

CHAPTER XVI

WORKING AND CARE OF ENGINES AND GEAR

DIRECTIONS FOR WORKING AND KEEPING STEAM FIRE ENGINES —STEAM MOTOR FIRE ENGINES — PETROL MOTOR FIRE ENGINES — FIRE ESCAPES — TURNTABLE ESCAPES — CHEMICAL ENGINES—MANUAL FIRE ENGINES—HOSE

THE following are the directions which are sent out with every "Greenwich Gem" *steam fire engine* These should be carefully mastered by the engineer in charge of the machine, and it is also as well for the chief officer of the brigade to make himself familiar with them, so that any error or neglect on the part of the engineer can be readily detected

To fill the boiler (steam not being up), attach the hand-pump hose to blow-off cock, and fill with hand-pump (or town pressure if available), that being a cleaner and handier method than pouring the water in at the safety-valve

The water in the boiler should never be below the mark on the brass guard on the gauge glass

When laying the fire, first place a small quantity of coal on the grate, then a fair quantity of dry shavings, pulling some through the grate in places, on top of which put plenty of wood (dry pitch-pine split small, about three-quarters of an inch square, and fourteen inches long) The fire should be lighted from underneath

Keep the tubes swept clean and free from soot

After about 10 or 15 pounds of steam have been raised, turn on the steam jet in the chimney, fire up with wood till 40 or 50 pounds pressure is attained, and then with coal (best Newcastle or Welsh is preferable)

The engine may be started with 80 or 90 pounds, when the steam jet should be shut, only using it afterwards if the fire burns dull

When at work keep the water in the boiler about half-way up the gauge glass, which may be done as follows —

Feed Pump —When the engine is pumping water clean enough for the boiler, turn the cock on the feed pump so that the indicator points to "Open to main pump," regulating it as may be found necessary to maintain a sufficient supply to boiler

Should the engine be pumping dirty or salt water, which would injure the boiler, turn the same cock to "Open to bucket," first attaching a small suction hose and placing it in a bucket or other vessel kept full of fresh water

The injector must be used as follows —First open the bottom cock leading to boiler, open the water cock leading to tank, then open the steam cock, gradually close the water supply cock until the overflow ceases When the water supply cock is once set it is only necessary to manipulate the steam cock in order to stop or start the injector If the injector at any time stops working, examine the strainer in tank, and ball cock on supply pipe Should the engine be pumping salt or dirty water, the cock in supply pipe to tank should be closed and the tank filled with clean water

In case of necessity, the boiler may also be rapidly supplied by shutting down the delivery valve to which the hose is attached, putting the feed cock "Full open to main pump" and running the engine slowly so that the pressure in the pump slightly exceeds that in the boiler This must not be done when the engine is pumping dirty or salt water

If necessary, water may be put in the boiler with the hand-pump by lowering the pressure in the boiler to about 40 pounds, first screwing the loose check-valve into blow-off cock

The boiler should be blown out each time it is used, at either of the blow-off cocks, and, if working a long time, a portion of the water should be occasionally blown out during work.

The interior of the boiler should be occasionally washed out through the mud holes provided for the purpose in the fire-box casing, and a wire should be pushed up from each hole to ascertain that the water space is clear If very dirty water has been used, and there is reason to suppose the tubes are coated internally, the joints at the top and bottom of fire-box may be taken apart, the fire-box lowered out, and the tubes thoroughly cleaned The top joint should be made with wired asbestos, and the bottom joint with a strip of india-rubber

On arriving at a fire, the stoker should see there is a proper quantity of water in the boiler, and a sufficient pressure of steam, also that the fire is in good order, and that the safety-valves act freely The engineer or driver (while the delivery hose is being attached) should see particularly that the suction-hoses have good leather washers in the couplings, and are screwed up perfectly air-tight; wipe clean and oil all the working parts of the engine, see that the delivery valve to which the hose is attached is open

Pour some good oil through the lubricator on cylinders.

When lifting water from a depth, open the pet cocks on pump to discharge the air, and keep all glands and joints tight It is then also advisable to use a foot valve in the suction pipe

See that the cylinder drain cocks are open Open the steam stop valve and run the engine slowly until the cylinders are clear of water, after which the cylinder cocks may be closed and the engine run at the required speed

The water bags are fastened inside the wheels to protect the paint from the hot ashes, etc , and are kept filled by the small hose attached to the cock on the pump

For fire duty a steam pressure of about 100 to 120 pounds should be maintained, and a water pressure varying from 60 to 140 pounds according to length of hose and work required

If, through neglect, the water in the boiler should get too low, well damp the fire till the proper level is regained, and if at any time the boiler should prime, run the engine slower, open the cylinder cocks and blow off a portion of the water from the boiler occasionally

If a delivery hose should burst do not stop the engine suddenly, but first open the fire door and see there is a sufficient quantity of water in the boiler

When the engine is travelling to a fire far distant, do not light the fire till near, so as to avoid getting short of water in the boiler on the road In some cases a good quantity of water is kept in the boiler (say half-way up the gauge glass), when a fire is near the station and steam required quickly, a portion of the water is run off while travelling

After the engine has returned to the engine-house the fire should be re-laid, water put in the boiler, coal bunkers filled, and hose and suction pipes cleaned and dried See that the washers are perfect and in their places (carry a few spare ones in engine), and that the suctions, hose, branch-pipes, wrenches, stoking irons, and all gear are in place and ready for an alarm

Pour some good oil through the lubricator on cylinders

The engine should be turned occasionally when standing in the station, with the apparatus supplied for the purpose

The engineer should use his spare time in seeing that the engine and apparatus are in perfect working order

When the engine is used from a very small supply of water, or delivering through a small nozzle, part of the water may be returned from the delivery to suction by slightly opening the bye-pass on front of the pump cover This allows of the engine running freely and at its normal speed, although only a small quantity of water may be pumped owing to the supply available

Access can be obtained to the whole of the pump valves by removing the cover on front of the pump. The valves are placed in pairs above each other, each nut securing a suction and delivery valve

It is not frequently necessary to remove the valves, as any obstructions can be cleared out after taking off the cover

To remove the valves, slack the nuts and draw the seatings with the valves on them

In frosty weather, after using the engine, the tanks should be emptied and steam blown through the injector

In engines arranged for frosty climates, a cock is put under the whistle, to which a small hose may be attached to thaw anything that requires it Drain cocks are also provided, so that no water is left standing in the pipes and connections

The hind wheels of the engine, if of wood, will be liable to shrink from the heat of the boiler and standing in a dry engine house When this occurs, the tyres must be taken off and contracted, as the durability of the wheels depends greatly upon receiving the necessary attention in time Washing frequently with water will tend to keep the wheels in good order

Steam fire engines provided with two outlets for the attachment of delivery hose may be made to supply four jets by the use of two breeching pieces

When the engine is placed at a distance from the fire it is advisable to employ two lines of hose, these being united at the branch-pipe by a collecting breeching, or they may be attached direct to a Merryweathers' Improved Double Branch-pipe

By this means the friction in the hose is greatly reduced, and the pressure at the nozzle is consequently greater

It is as well, also, to examine occasionally the travelling gear, when the engine is standing in the station; it should be seen that all split pins, lynch pins, and washers are complete and firmly fixed, and that the axle boxes are well lubricated The wheels might be taken off every four months, and about every three months the oil caps might be re-filled, this latter can be done without taking off the wheels If the engine gets a good many runs it will, perhaps, be well to attend to this matter somewhat more frequently, but for the average of Volunteer Brigades three or four times a year would be frequent enough

As regards *steam motor fire engines* (Fire Kings) the foregoing instructions apply, in so far as they refer to the working of the boiler and pump The printed instructions which are always sent with this type of fire engine also include the following special items —

Steam can be raised in the boiler in three ways First, by keeping a gas jet in the fire-box If sufficient gas is burnt to keep a standing pressure of 80 lbs of steam on the boiler, the liquid fuel burner can be started and the engine got under way immediately If sufficient gas is burned only to keep from 15 to 20 lbs pressure of steam on the boiler it will be sufficient to start the liquid fuel burner, and 100 lbs can be raised within two minutes Second, preferable to this is the use of the special coke heating apparatus which is fully described in Chapter VIII Third, if the boiler is kept cold, a stick and shaving fire can be lit in the fire-box to raise the first 15 to 20 lbs of steam for starting the burner Under these conditions it will take about six minutes to raise steam to 100 lbs

The liquid fuel tanks in the front part of the engine should always be kept standing full of refined paraffin of a good brand As suitable brands of oil we may mention — "White Rose," "Tea Rose," and "Czaroline " Crude petroleum may also be used quite successfully The oil should always be poured into the tanks through the strainer funnel supplied for the purpose, and care should also be taken to see that the fine wire gauze strainers fitted in the openings of the tanks are always in position, and are frequently removed for examination and cleaning

It is of the utmost importance that the oil should be kept free from dirt It is also advisable occasionally to wash out the tanks, and also to remove the oil connections to the burner and see that they are free from dirt and obstructions.

Before starting the burner a pressure of steam or air must be obtained in the boiler of from 15 to 20 lbs to the square inch A piece of oily waste should then be lit and dropped in the firebox, just in front of the burner The oil valve must be opened gently until the oil is observed to run out of the burner, and the steam pressure from the boiler should then be turned on sufficiently to project the oil into the firebox, when it will at once burst into a flame Only a little oil should be turned on at first, and the steam valve should not be opened to allow the pressure to drop below 15 to 20 lbs As the pressure rises in the boiler more oil can be turned on and more steam in proportion

When from 20 to 30 lbs has been reached the blast cock should be opened slightly, which will improve the combustion of the oil

In raising steam to working pressure a little smoke will probably be made, but, after a pressure of 40 lbs of steam is obtained, the oil should be burnt without smoke, or at least only a slight brown vapour should show from the uptake

If too little steam or too much oil is used, a smoky fire will result, and if too little oil and too much steam is used, a short blue flame will be produced The correct appearance of the fire should be a light yellow flame with a very slight brown smoke coming from the uptake If too great a steam pressure is used the burner will blow out If this occurs, at once turn off the oil and re-light the burner by a piece of oily waste or flaming fusee Before doing this, always see that the blast cock is turned on, as otherwise an explosive mixture will be formed in the firebox, which will emerge from the fire door

When standing in the station the pumps should be disconnected and the toothed pinion on the crankshaft should be kept in engagement with the spur wheel on the differential shaft The steam stop valve on the cylinders should be kept full open, and the drain cocks open The regulating valve lever worked by the driver should be kept right back, and the reversing gear lever in the centre notch

It is first necessary to learn to steer the engine perfectly, and for this purpose a quiet road should be chosen, where there is little traffic High speeds should not be attempted under any circumstances until the driver is thoroughly at home with the manipulation of the machine, both in steering and using the brakes, etc It is advisable to learn to steer with the right hand only, so that the left is always free to work the regulating lever, although this can be left, and both hands used on the steering wheel when going round corners or in any other tight places

When starting the engine from rest the reversing lever should be put in its first notch forward, and the regulating valve be opened slightly The regulating lever should under no circumstances be thrown forward with a jerk, as it throws a great deal of unnecessary strain on the mechanism throughout

When the engine is got well under way, the reversing lever can be brought back towards the centre of the rack and notched up as much as possible, provided that the engine is running smoothly and without jerks

When slowing down the engine shut off the steam and apply the foot brake gently If it is necessary to stop within a very short space, first shut off the steam and then bring the reversing lever back towards the centre notch If this does not bring the engine up quickly enough, bring the reversing lever into its back notch and open the steam valve gently As soon as the engine has stopped close the steam valve

In driving on a very muddy road it is inadvisable to stop the engine in this manner, as the driving wheels are locked suddenly, and a side slip might occur Where the roads are treacherous, it is always best to drive carefully and slow the engine up in good time before coming to any tight place on the road

In descending very steep hills the wheel hub brakes should be applied, the same brakes also being available in the event of any of the gear giving way between the engine and the rear wheels

In driving astern put the reversing lever it its last notch backwards and drive very slowly

Care should be taken to see that there is always water in the feed tanks, and in travelling long distances that they are not emptied before being close to a fresh supply

On arriving at a fire the driver should shut the steam regulating valve, worked from the driver's seat, and the main stop valve on the engine cylinders He can then open the regulating valve and drive by the main stop valve He should then throw the engine out of gear with the differential shaft by sliding the pinion on the crankshaft clear of the spur wheel on the differential, locking it securely in this position

The pump rods can be coupled up to the cross-heads, while the suction and delivery hoses are being attached Care should be taken that the swivel nuts are screwed up hard by means of the spanner provided for the purpose

Before starting the pumps see that the delivery valve is full open and that the suction connections are all well tight

Chains can be removed by withdrawal of screwed bolt and nut in one of the links of each chain Always keep chains tight enough When properly adjusted they should sag about ¾ inch to their centres by their own weight This can be adjusted by the swivel nut on the compression stay to the back axle

The following special cautions should be carefully observed .—

Do not talk to the man at the steering wheel

Do not stop suddenly on a greasy road

Keep all lubricators well filled with proper lubricants, especially the wheel axle caps

Screw down all solid grease lubricators one turn at each stop.

If burner goes out, do not light up again without turning on blast

Never let engine get beyond control of brakes down hill

See that the safety valves blow off at 120 lbs

Never run short of clean water in feed tanks

Never lose sight of water in gauge glass, if you do, shut oil valve immediately

On returning from run, go carefully over the whole engine See that all nuts are tight and that brakes are in perfect adjustment

In removing any of the working parts for examination or adjustment —On replacement, see that split pins are all re-fitted and properly opened out

Keep a full set of spare parts always ready for emergencies

The Liverpool Fire Brigade have the following printed instructions as to the working and care of steam motors They are, of course, to a certain extent similar to those sent out by the makers, but I have set them down in full, as they represent the experience of users of the machines, and emphasize those matters which are found to be most frequently overlooked or neglected —

When a steam motor is on station duty keep an approximate pressure of 80 lbs per square inch

Never allow the water in the boiler to get below half-glass

Blow the gauge glasses through at least once every two hours If the water is slow to return to its normal height, report to the Engineer Inspector at the C F S

Keep the outer arms of the gas burner thrown well out; that is, they should touch the inner shell of the boiler This is necessary to ensure a proper distribution of the heat, or in other words, to evaporate over a larger area

The link-motion (centre lever in front) should always be in mid-gear when the motor is standing with steam up The control or throttle valve (lever on the off side) should be closed, that is, pulled over towards the driver's seat, when the motor is standing

Keep all oil boxes full of oil, but shut off while standing with engines not working Do not fill the cylinder oil cups with any other than cylinder oil (thick oil), as engine oil carbonises and does more harm than good

Particular attention must be paid to the oiling of the differential gear and sprocket shaft, as experience has proved that because the parts are difficult to get at, they have been neglected

The oiling of all the working parts of the steering gear at regular intervals is most important The joints being made of steel, if allowed to run dry will seize, when they will become absolutely immovable See that the oil is actually passing through the pipes

It is imperative that a careful examination should be made daily of bolts and nuts, to ensure them being tight. Neglect of this may lead to not only damage to some costly part of the machine, but also to the loss of life or limb

When the fire-bell rings and the steam motor is needed, the first duty of the stoker is to remove the cover from the top of the uptake After doing this take the gas-burner out of the fire-box, and, lastly, set the fire away, not forgetting to put on the blast

Complete combustion is taking place only when no smoke is being emitted from the uptake, therefore at any time if smoke is present increase the supply of steam to the burner It may be there is a maximum supply of steam to the burner, if so, decrease the supply of oil

When at a fire the stoker will attend the boiler, and pay particular attention to the water gauge glass, never allowing the level to be less than ⅜ glass If by any means the water should be lost sight of, your first duty is to shut off the fire Do not attempt to put any water in the boiler either by the injector or the feed pump, but send at once for the Engineer Inspector or one of the Engineer Sergeants

It is also essential that the stoker should see the boiler is fed with clean fresh water If salt or dirty water is being passed through the pumps, lay down a main supply for the tanks

It is advisable that all drivers (without much experience) proceed cautiously until they gain that confidence which experience brings Always remain master of the steering wheel and throttle valve Never attempt to turn a corner without first reducing the supply of steam to the engines, and the same may be said in trying to evade any obstacle on the road, viz , first reduce the steam

When driving down a steep incline never allow the machine to gain too much speed, but always keep control by the brakes As a last resource, the reversing gear may be used, but this must be carefully handled and not used unnecessarily It is well to remember if anything should go wrong with the reversing gear, or a chain should break, the machine becomes uncontrollable

Before the driver mounts the machine he should see the steam stop valve opened (only when the link motion is in mid-gear with the control valve closed), all lubricators full of oil and opened, and also that the cylinder drains are open After running for a minute or so the drains may be shut out when the cylinders are heated and relieved of water

On arrival at a fire and the pumps are required, the duty of the driver is to connect up for pumping

(1) Close the stop-valve to the engines

(2) Place the reversing gear in forward slot, and the throttle or control valve open full

(3) Throw the engine out of gear for the road by disengaging the spur-wheel on the engine shaft

(4) Put each engine separately on the bottom centre and connect the pump-rod to the cross head with the coupling nut provided The engine will be turned by giving steam from the stop-valve

The engines are now ready for pumping

After pumping is finished and the hose to the suction and delivery is disconnected, the water in the pumps should be expelled by running the engines for a short time.

(1) Disconnect the pumps from the crossheads

(2) Put the spur-wheel in gear on engine shaft

(3) Put the reversing gear in mid-position and close the control valve.

(4) Open the stop-valve to the engines when all is ready for starting

NOTE —At all times when starting or stopping the engines the drain cocks to the cylinders should be open

For the efficient working of the auxiliary pump when required, it is necessary for the officer in charge to test it at least once a week By so doing the bucket leathers will be kept soft, which will enable the pumps to pick up the water much more easily than if they are dry and hard

The air cocks should always be open to the atmosphere unless the pump is throwing water

If the pump will not pick up the water by increasing the speed of the engine, the introduction of a little water at the air cocks should enable it to do so.

It is somewhat difficult to give a general set of instructions applicable to *petrol motor fire engines*, owing to the variety of gearboxes, clutches, carburetters, motors, etc , which are commonly employed With regard to actual running on the road, the precautions are very similar to those given for the steam motors The following remarks will apply in most cases The motor described is fitted with a gate change gear-box, a multiple jet carburetter, has dual ignition by high tension magneto and coil and battery, and is driven by chains The pump is of the well-known Hatfield three-throw reciprocating type

To Charge Accumulators —The accumulators should be filled with diluted Sulphuric Acid, specific gravity 1 190.

Only the best Sulphuric Acid, free from impurities, should be used

This strength, 1 190 S.G , is about one part acid added to four parts distilled water

Charging should be commenced immediately after filling with acid and continued for 16 to 18 hours, or until the positive plates turn a good deep chocolate colour

Acid should just cover the tops of the plates, or about ¼ in below sealing or celluloid lid. Charging rate 2 amperes

It is of the utmost importance that they should be kept right up to 4 5 volts in order that the ignition gear may work satisfactorily

Before Starting Engine —Fill tank with petrol, which should be of a specific gravity of not greater than 7

To Start the Motor —First see that the change speed lever is in the centre of gate, which is its free position, before attempting to start the engine Turn on petrol cock and flood carburetter, by lifting the float feed valve spindle several times in succession

Switch on the current from the accumulators Adjust the lever on the right hand side of the steering wheel, which controls the time of ignition, about three teeth from the back of the rack

Adjust the throttle lever on the left hand side of the steering wheel about half way up the rack Depress small pedal to allow of half compression Smartly revolve the starting handle, if everything is in proper order the engine should start running Switch off accumulator and switch on magneto The throttle lever should then be brought back to allow the engine to run slowly

To Stop the Engine —Switch off the current from the accumulator and magneto

Lubrication —The lubrication is of the semi-splash type with forced feed to crankshaft A gear driven pump takes its supply from a sump on the crank case and delivers oil to the three main crankshaft bearings, from whence it is taken by means of holes drilled in the crankshaft to the connecting rod ends, from these it drips into the crankcase A strainer is fitted into the crankcase at a sufficient height to keep the oil always at a proper level, the remainder overflowing into the sump, from which it is again pumped through the lubricating system An indicator is fitted on the dash, which shews that the lubrication is working properly If it stops it shews that there is either some obstruction in the system or that there is no oil in the sump

The whole of the oil in the crankcase and sump should be removed periodically and fresh oil supplied

Care must be taken to lubricate sufficiently the high tension distributer

Care must be taken to use only motor car cylinder oil, of which a reliable local supply can no doubt be obtained The lubricators for the cam shaft should always be kept full of *thin* oil and the wicks occasionally cleansed to ensure proper capillary action

Sufficient lubrication is denoted by a slight white smoke issuing from the exhaust box on starting The gear wheels and axle arms run in thick grease, what is known as Stauffer's lubricant is good, and the same must be used in the screw down lubricators when fitted Heavy cylinder oil can also be used with advantage in the axle boxes

The clutch requires careful attention and lubrication to ensure its proper action A thin mineral oil is most suitable for the purpose The correct amount is found by removing two oil plugs and turning the engine until one of the holes is at the top If oil is now poured in until it begins to overflow at the side, the quantity will be correct, and the plugs should be screwed up, care being taken not to omit the leather washers which keep these plugs tight

A small quantity of oil may be added occasionally and the clutch should be washed out with paraffin and a new charge put in every month

Care of Engine in Station —Thoroughly cleansing is of course a necessity, both of the outside and of all the parts of the engine and gearing In order to be sure that the engine is always ready for a turn out, the engine should be frequently started up during the day and night as detailed above Any refusal on the part of the engine at the first two or three turns of the handle should be carefully looked into and the cause found out

The accumulators should be tested daily and the sparking plugs occasionally removed to clean the contact points, etc The exhaust valves should also be looked at occasionally, and if at all pitted should be ground in with a little emery powder and oil

The cover of the change speed gear box should be occasionally removed and notice taken that the wheels are properly in mesh, in accordance with the notches on the change speed lever quadrant

To Start Travelling —Get the engine running slowly on throttle, declutch until transmission shaft stops revolving and engage first speed forward on left side of gate after starting, but without racing engine engage second speed forward in rear of right side of gate, and then third speed in front right side of rack Should the wheels not slide into mesh without trouble and noise, it indicates that the clutch is not properly disengaged, either through bad lubrication or the refusal of the clutch brake to properly engage In no case must the gear wheels be forced into mesh, as the edges of the teeth will soon get damaged and the gear wheels otherwise seriously injured

Practise steering on the low speed until confidence is obtained In changing on to the high speeds always open the throttle lever, and it will be found that with a little practice the gears will slide into one another without shock or jar The back position on left of rack is for the reverse

The pedal brake will be sufficient to slow the engine or stop it fairly quickly when driving in traffic or running down hill If, however, it is required to stop very quickly, the hand lever brake must also be used

On arriving at a fire, to couple the pump to the motor the change speed lever must first be put into its neutral position The clutch is then depressed and the pump gear lever on the off side frame be brought into position, when the pump pinion will be coupled direct to the first motion shaft on the gear box Let the clutch in and run the pump slowly at first, afterwards opening the throttle full and advancing the ignition as far as possible to get the most work from the motor

Special Caution —After the pump is started care must be taken to see that the cock leading to the water cooling system of the motor be open sufficiently until the supply overflows from the cooling water tank, the overflow being allowed to run away

In order to make sure that the cylinders are sufficiently cool, an adequate supply must be kept going so that the overflow is not at boiling point If this is forgotten and the engine is allowed to run hot, and a sudden supply of cold water is turned on, the tops of the cylinders are liable to crack

A supply of good machine oil (not motor engine oil) should be kept in the crank chamber of the pump, and the lubricators at the ends of the piston rods must always be kept full of Stauffer or other suitable lubricant

The valve covers should be removed from time to time to see that the valves are in good condition, and the crank-case cover be taken off occasionally to see that the glands are tight

When working through long lines of hose, or with a short supply of water, entailing the use of a small nozzle, the byepass valve on the upper part of the pump should be slightly opened to allow of the pump and motor running at normal speed

When a turbine pump is employed some means of "priming" has to be devised The most satisfactory plan is to start the pump running with the delivery stop valves all closed The suction pipe is then exhausted by means of an air pump operated from a pedal on the footboard Water having been drawn up into the pump casing in this way the delivery valves may be slowly opened. The pump should be opened up at least once a year for the purpose of removing any extraneous matter that may have collected inside

The following are the instructions for the successful working of *chemical engines*

The charges should consist of the white bi-carbonate of soda, of ordinary commercial quality, which can be obtained for about 10s per cwt Tin canisters provided for the purpose should be kept full, one canister for each cylinder

The acid must be sulphuric, of ordinary commercial quality, having a specific gravity of not less than 1 7, and preferably 1 8 This is a matter of great importance, as if the acid is weak sufficient pressure will not be obtained It must be handled very carefully, as it is most injurious to the hands and clothes, the lead bottles should be filled up to the beginning of the neck, and one of the thin lead capsules be screwed down tight over the neck The spanners provided for the purpose should be used, and the bottles stood on end for a few minutes, to see that they are perfectly tight

The chemical charges are approximately ½ lb bi-carbonate of soda and one fluid ounce sulphuric acid per gallon of water

To charge the cylinders first open the overflow valve, connect up to hydrant with hose, fill the cylinder till it overflows through the valve Put in the soda and stir well with agitator Lock the agitator handle with the catch prepared for the purpose Insert the acid bottle, cap downwards, and screw on tightly with wrench

To discharge the cylinders see that all the valves are closed tight, release catch on agitator handle and turn round once—this will let the acid into the soda and carbonic acid gas will be generated, the pressure will rise slowly until it blows off at the safety valve at about 140 lbs. per square inch The charge can then be let into the hose and worked off as desired through the nozzle. After discharging the cylinder should be washed out with clean water, and the pricker well greased before recharging.

The following extract from the appendix of the Rules and Regulations Book of the Birmingham Fire Brigade has been slightly modified so as to include only what is applicable to *modern escapes*

Keep the escape thoroughly clean, and in doing so examine every portion of the machine, instantly reporting if any repairs are necessary

Thoroughly examine the escape from top to bottom, making certain before you take charge from the man you have been sent to relieve that everything is correct

Each man, on returning to the fire engine station to which he belongs, will report to his District Officer the state of the escape and apparatus when he gave up charge, also anything of importance that may have occurred during the time he was on duty

The man in charge will employ one assistant to assist him in taking the escape to a fire, but should he require further assistance he may engage it, and state in his report the cause

If he requires to send a messenger on foot, he is to do so, and such messenger will be paid according to circumstances

Proceed to the spot as quickly as possible

Accidents sometimes occur through the fireman not advising his assistants, while proceeding to the fire, what is best to be done

It is necessary, in taking the escape to a fire, to be careful to prevent accidents, either to life or to the escape. If an accident should occur, it may result in a serious loss of time, and perhaps render the escape useless

Do not place the escape against the building on fire until you have decided how to act.

Having decided that it will be necessary to use the escape, be careful to place it on the same side of the fire from which the wind is blowing, so as to protect as much as possible the person to be rescued, as well as the escape, from heat and smoke

Place the upper part of the main ladder carefully against the building, so as not to strike it with force, or the ladder may be broken by the blow

The weakest part of the escape is the centre of the ladder

In all cases use the props, if possible

Place the upper part of the escape, as far as you can, inside the window of the room, so as to assist the persons to be rescued in getting firmly on the ladder before they begin to descend

Do not allow more than three persons on the ladder at the same time

The following remarks should be carefully regarded in dealing with *turntable escapes*

When standing in the station the ladders should project at the rear far enough to allow the spring stop to engage with the catch on the ladder side This leaves sufficient weight forward to keep the ladders on the head rest, while they can be easily swung off the carriage The friction grips on the compression stays must be left free

If the escape is carried with the back fly folded down, which it should be, this must first still be raised until the spring catches retain it in its working position One man then hangs on to the rear end of the ladders while the driver and officer push the ladders up from the front, or the officer may immediately dismount while the ladders are swung up, another man hanging on the back fly if necessary

When the feet of the ladder are on the ground the spring ladder catch on the sliding carriage is turned back out of action, and the ladders are raised to the required angle of elevation by means of the raising gear on the back fly Be sure that the ladders are sufficiently upright and then *tighten up the friction grips* Also take the load off the rear springs by tightening down the screws over the rear axle.

Two men can easily slew the ladders round the turntable so as to point the ladders in the required direction, and this should be done before extending them

The ladders are extended by means of the winding gear on the main ladder When extended the overhanging weight may raise the swinging feet slightly off the ground, in which case the ladders should be lowered on the sliding carriage until their weight is taken on the feet, thus relieving the tension in the wire rope

Plumbing gear is provided for bringing the ladders upright if the carriage is on a slope, or for putting the ladders over sideways if required Careful judgment is needed in doing this, however, and the ladders should only be set over sideways at short extensions, always being kept carefully upright extensions

To ship the escape, slew it round until the white lines on the turntable rings coincide Adjust the plumbing gear to central position

Free the spring catch on sliding carriage

Loosen the friction grip on compression stays

Wind the ladders backwards on the sliding carriage until the spring catch engages

Swing ladders into the head rest

Fold down the back fly

Loosen the screws over the rear axle, bringing them well up, and secure the handwheels by the chains

The machine is ready for travelling

If it is desired to pitch the escape at a low angle it is advisable to wind the ladders down before altering their position on the sliding carriage, as, if extended, their weight may overpower the men on the back fly when the friction grips are released

It must be remembered that these grips are relied on to support the ladders in an upright position

The three winding gear shafts are fitted with ball bearings These should never be oiled, but packed with motor grease every three months

Care must be exercised to avoid getting too much extension combined with too low an angle of elevation, as the ladders might be severely strained, and if extended so as to project too far over the carriage sideways they might cause the machine to overturn The ladders cannot easily tip the machine over when projecting *endways* over the front of the carriage

When using the ladders as a water tower make sure that the feet are firmly on the ground, as this will ensure a rigid base, making it practically impossible to tip the ladders over backwards

When throwing a large jet from the escape it must be kept quite *square* to the ladders and not partly sideways, as this would tend to bend the ladders sideways

If it is required to turn the jet in another direction the ladders must be slewed and not the jet

The following are instructions for working and caring for *manual fire engines* —

The fire engine should be kept clean in every particular with a little good engine oil on the bearings, in the pumps (on the top of the plungers), and in the axle boxes of the wheels.

The hose and appliances should be kept clean, all coupling screws polished, the threads uninjured, and a leather washer in each female part, moistened with clean oil, and the swivel part of same should turn on its lining freely by hand

All appliances for use with the engine should be kept in their respective places in or upon the engine, but damaged hose or fittings should not be stowed on the engine until thoroughly repaired and fit for use

The engine, clean and equipped with appliances as above, should be kept in a dry house of sufficient size, the drag handle fitted on the fore-carriage, and the pole and sway bars or shafts underneath, conveniently at hand

Spare hose and appliances should be placed on brackets affixed to the side walls of engine house

On receiving an alarm of fire, if the distance is not great, run the engine to the scene by hand If the distance is great, detach drag-handle and replace with pole and sway bars, or shafts, horse the engine, and proceed to the fire with all speed

On arrival, place engine as near as convenient to the water source, connect the suction hose to the screw at rear of engine, couple together as many lengths as requisite very tightly with the aid of the wrenches, screw strainer on extreme end, and place strainer end entirely under the water Care must be taken that the leather washers are in their places in the female halves of the couplings If the source be a pond or well, strap a basket strainer over the copper strainer as a double precaution against the entry of weeds, etc , to the valves of engine

If engine is to be fed from hydrants, open folding canvas cistern on level ground near hydrant for water to run into, either direct or through hose, and place strainer of suction hose into the cistern, or the suction may be connected direct to the hydrant by means of a double female screw

If engine is to be fed from buckets, etc , screw the cap tightly on suction inlet at back of engine, place a hose wrench or other lever in the iron bow inside rear of engine cistern, and turn it round until it is unscrewed, then lift up iron rod and cap and pass the loose pin through the hole in the rod to keep it up, water may then be poured into the cistern of the engine over the strainer board (or if the water source is very distant from the fire, one engine may be used to pump into the cistern of another) The engine will then draw from its own cistern

Square the fore-carriage and secure it by passing the iron pin through the hole in the locking plates

Take requisite hose and appliances from the engine, connect the swivel coupling of delivery hose to the delivery outlet at side and run out the hose, coupling up as many lengths as required to reach the fire, screw the copper handpipe (or director) with a nozzle of suitable size on end, and place a fireman in charge of same

Unfold the pumping levers (if fitted to fold), place the correct number of pumpers each side, remove the lever lock-iron (if so fitted), give word "Get ready," and if all ready, "Down with her," when the pumpers should proceed to work the levers slowly up and down, striking on the beat leathers each side, until the jet appears, when the speed may be increased

Forty double strokes (once up and once down) is the usual speed, but sixty is the maximum

See that no sharp bends or twists are in the delivery hose, if requisite, the hose may be taken into the building on fire, up the staircase, over the roof or through a window opening, as the man directing the handpipe should get as near the seat of the fire as possible so that the water may strike with force on the burning material

If engine has two delivery outlets two separate lines of hose may be coupled and the fire attacked from two points, or dividing breechings may be used for this purpose, one stream to extinguish the fire and another to protect endangered property being frequently required

All appliances should be handled carefully

After the fire has been effectually extinguished replace the appliances on the engine, and on return to engine-house ascertain if everything is sound, pump engine quite dry (if she has been pumping dirty water, pump a little clean through her), thoroughly clean all the appliances, and replace them in the engine in an orderly way, ready for service when again required

When standing in the station unused, in the case of manual engines it is very desirable that an examination should be made at pretty frequent intervals, say about once a month, in order to ascertain that the leathers of the joints have not become hard and dry If this be allowed to occur, leakage will take place All the joints, including those of the valve box, suction inlet, and delivery outlets, air vessels, etc , should be examined, and if a defective one be found should be remedied at once

In order to ascertain with more certainty that the engine is in thorough order, it may be tested in the following manner A blank cap should be procured, in which a boss is cast and screwed, a small cock can then be fitted to the boss, so arranged that a pressure or vacuum gauge may be attached to it To test the suction valve this cap, with the vacuum gauge attached, should be screwed on to the suction inlet The air cock being shut down, a stroke may be made with the pump levers If the engine is in perfect condition the gauge will show a vacuum of about 15 inches, and will hold it for some time If this vacuum is not registered, or should it be quickly destroyed, it may be assumed that some of the joints are not tight When worked continuously a vacuum of about 25 inches should be reached and retained

To test the delivery, the cap with a pressure gauge attached should be screwed on to one of the outlets, the other outlet being closed with an ordinary cap The pumping handles may then be worked up and down, and a pressure of at least 40 lbs should be reached and retained The air cock must, of course, be closed when the handles are working

An experienced fireman would obtain a sufficiently accurate knowledge of the condition of the engine by merely placing his hand over the suction inlet or delivery outlet whilst the pumping levers are being worked, without troubling with the vacuum and pressure gauge

If it is found on trying the engine with water that it does not do its work properly, and it is seen that there is nothing wrong with the joints, it will be well to examine the valves.

This may easily be done by taking off the valve box cover—the valves can then readily be inspected, and if there is an obstruction it can be at once rectified The covers are then to be screwed down again, and the engine is again ready Should the joints be right, and the valves be right, and still the engine does not work, the probability is that the suction hose is not air tight, or that there is a leak in the connection A very common fault is the want of a washer in the suction couplings, this little deficiency, by allowing air to enter the engine instead of water, is quite sufficient to spoil the performance of the engine

The subjoined are special directions in regard to *the hose*

After using leather hose, well rinse it in clean water, hang up by the middle to drain, but before quite dry brush it over with best prepared hose oil, then tightly coil up, keeping the rivets downwards If the rivets are dirty, scrape them with a blunt knife, or a putty knife, and finish off with a wire card If the hose has been allowed to get dry and hard through neglecting to dress it, soak it well in lukewarm water, and then oil it as above Note—Dress the hose each time after using at a fire, and if not used, dress it every two months to preserve it

If you cannot get the above hose oil, use the best tallow—not bleached When ordering leather hose, order the oil at the same time of your hose maker, say 10 gallons for every 500 feet ordered

After using rubber-lined canvas hose, well wash in clean water, and dry it perfectly If you have a boiler-house or heated room, place it therein until dry If rolled up when damp, even in the slightest degree, it will rot

In use be careful not to drag it over rough roads or sharp walls, as the canvas may be cut thereby, thus rendering the hose useless

In the case of canvas hose, use the precautions directed in the case of rubber-lined canvas hose.

After using india-rubber hose, well wash in clean water and roll up carefully There is no preservative for this kind of hose.

For the purpose of effectually drying hose it is advisable to have a special rack A very good form consists of a strong frame of wrought iron, carrying four pulleys, and arranged for bolting to the external wall of a fire engine station Each pulley has a length of rope, one end of which is fitted with an attachment for carrying a length of hose The hose is preferably suspended from one end, but if sufficient height is not available the hose must be hung from the centre, so that the water can drain out of each end It passes over a small roller, by means of which damage to the hose at the bend is prevented The framework is covered in at the top with a light metallic roofing to protect the hose from the weather, and cleats are provided to secure the ends of the ropes when the hose is hoisted This apparatus is sometimes made in a suitable form for affixing to beams in a hose drying tower in a fire engine station The small cost of a hose drying rack will in most stations be quickly saved by the enhanced durability of the hose itself

CHAPTER XVII

DRILLS

'S TRAINING AND EDUCATION—THE NEED OF FIRE DRILLS IN PRIVATE AND PUBLIC INSTITUTIONS—THE NATIONAL FIRE BRIGADES UNION

SYSTEMATIC training in fire drill begins with a complete exposition of the use and method of handling all the various appliances. Upon a recruit entering a brigade, the first step is to shew him every implement, and to explain what it is used for, and how it is manipulated. This is the fireman's goose step; the next study is a course of engine, hydrant, escape, and life saving drills, with the object of promoting skill and celerity. The finishing touches include instruction in the art of managing fires and saving life under varying conditions, easy and difficult; the recruit has developed into a first-class fireman when he can take the duty of any member of the brigade, from the highest to the lowest. The third part of his education is never finished, and may be rendered more valuable by a little scientific reading as a supplement to the experience gained in the course of every-day work. One of the most practical methods of drilling a brigade is to visit, periodically, every manufactory, large residence, and building of importance in the locality under protection, and to make the brigade as far as possible acquainted with the details of their construction, means of water supply, number and positions of exits, etc. A thorough inspection of every hydrant in the district should also be made periodically, and the opportunity taken to make the brigade acquainted with all the details of water supply, at the same time ascertaining that all the sluices, cocks, hydrants, indicator plates, etc., are in proper order.

In these days fire drill with volunteer brigades is no longer undertaken in the half-hearted and perfunctory manner which was not uncommon twenty-five years ago The drills of many private brigades also are of a most efficient nature But the fire drills undertaken in connection with large public and private institutions still often leave much to be desired There are many institutions in this country which have excellent fire protective appliances, in which no such thing as an organised fire drill is held from one year's end to another When an alarm of fire is given, more or less of a panic occurs in consequence, and it is useless to expect the best of fire appliances to be brought into action effectively if it is not some definite person's duty either to work or to superintend the working of them, or if the workers are not thoroughly familiar with the apparatus they are using

In hospitals, asylums, and other buildings in which a fire would endanger the lives of many people, some of whom, at any rate, are unable to help themselves, fire drill is of the utmost importance For such institutions especially it is advisable to instruct a fire inspector to call periodically for the purpose of inspecting apparatus and holding a drill This system of periodical attendance is useful in connection with all private brigades, for the reasons given at length in my *Fire Protection of Mansions* (Third Edition, pages 109-111)

As regards the actual forms of drill I do not propose to go into detail Twenty-three years ago, when the first edition of this book was published, there was a great lack of uniformity in fire brigade drill My own firm at that time interested itself in the matter, and was responsible for the publication of several forms of drill for Volunteer Brigades

Now, however, the National Fire Brigades Union has taken up this work, and in recent years, largely owing to the influence of this Association, fire drills have made great progress in the direction of uniformity and efficiency.

With the great number of different kinds of fire appliances now in common use, the various forms of drill form quite a subject in themselves, and one which I could not possibly deal with profitably in the space at my disposal. I will therefore refer my readers for all forms of fire drill to the excellent handbook on the subject which is published by the National Fire Brigades Union, and my advice to all new brigades is to adopt these drills in their own work, and so bring themselves into line with the rest of the fire brigades throughout the country.

CHAPTER XVIII

WORK AT FIRES

DUTY OF EACH OFFICER AT FIRES—PLACING THE ENGINES—LAYING DOWN HOSE—FRICTION IN HOSE—THE SUCTION HOSE—PRACTICAL DIRECTIONS FOR WORK—HOW TO MAKE THE BEST USE OF WATER SUPPLY—GENERAL REMARKS ON WATER SUPPLY—WORK INSIDE BUILDINGS—AGRICULTURAL FIRES—USE OF AMMONIACAL LIQUOR—PROPER SIZES OF NOZZLES UNDER VARIOUS CIRCUMSTANCES—HOW TO DEAL WITH SMOKE—BACK DRAUGHT—INFLAMMABLE LIQUIDS—FIRES IN BUILDINGS OF EXTREME HEIGHT—SPECIAL RISKS.

It now becomes necessary to consider the actual work of a brigade at fires. To secure proficiency in this is the object of all the organisation, drilling, and apparatus of which I have been treating, but undoubtedly, it depends upon something in addition to all these. To good men must be added good tools, and to good tools good drilling, and to good drilling good station arrangements, and means of call, and to all must be added something more, namely, an acquaintance with the nature of the real work to be performed. To obtain this knowledge in its perfection is not possible, the ablest fire brigade officers are always learning. It involves some scientific knowledge, and a great deal of practical experience, of which latter, notwithstanding my temerity in dealing with the subject here and in the "Fire Protection of Mansions," it must be understood that I make no pretence to possess. The opinions and counsels contained in this and the next chapters are founded however upon the results of the accumulated experience of some of the ablest officers in the service, and may be depended upon as embodying the best English practice in dealing with fires.

The exact duties which each officer of a fire brigade is to undertake at a fire should always be clearly understood by himself and his comrades In Volunteer Brigades, the officers not living at the engine station, it is usually arranged that upon receipt of an alarm of fire, the chief officer and his assistant proceed to the scene, while the third officer goes to the engine house, and brings the engine and brigade to the spot, the latter is responsible that all the gear is taken with the engine On the arrival of the engine, the chief officer gives his orders to the third as to its position, he has previously inspected the place, and understands exactly the certainties and the possibilities of the fire spreading, he has also, if possible, seen the owner or responsible person, and discovered what supply of water is to be had, and other necessary particulars It is a special duty of the second officer to see that the proper quantity of hose is laid down in the best position If the engine is a manual, the third officer sees that it is properly manned, in working order, and the fore-carriage locked, he keeps an account of the time, names, and number of the pumpers, and takes care they are not interfered with in their work To him also belongs the duty of distributing the refreshments, which, especially in the case of men at the levers, are inevitable

The engineers, or by whatever name the senior firemen next in rank to the officers are known in a Volunteer Brigade, are commonly the men whose special work it is to hold the branchpipes, they have also the looking after the engine and hose, and the keeping of them in working order In a motor or steam fire brigade, the first engineer has charge of the engine, both at a fire and in the station, and is solely responsible for its being in proper condition He usually drives the engine whilst the second engineer attends to the stoking, if the engine is a steamer The branchman, in whom the whole operations of a brigade at a fire come to a focus, should always be a man of good practical sense, and on his appointment he must be impressed with the exact nature of his work, and the manner he is to go about it, he should also be cautioned against playing upon the bystanders under any circumstances, either at work or practice

The duty of the ordinary members of the brigade is to lay down delivery hose, attach suction and strainer, and generally to get the engine ready, under the direction of the officers, to clear obstructions, pull down walls or buildings as necessary, and to save property or life where endangered, acting strictly under the instructions of the officer in command To him all enquiries or suggestions must be referred, if it be thought necessary to notice them all All the members of the brigade are expected to obey all orders promptly and silently, without excitement or shouting, and they should be specially trained at drills to do this

It is undoubtedly the duty of a fire brigade officer, in towns where it can be done, to acquaint himself in a measure with the different larger buildings there, and to consider how a fire may best be attacked in them, so that when an alarm is raised he may not be quite unprepared or uncertain how to act, and may thus be able to prevent many mistakes which, in the hurry of the moment, might be made disastrously One of the chief things to be noted is the different means of water supply, especially in the neighbourhood of risks more than usually hazardous The chief officer of a brigade should also in all cases make a careful examination of premises after a fire, in order to see that the very best means to extinguish it have been taken, he can then take note of errors and imperfections for future guidance

The great object of a brigade when called out for actual duty is to put out the fire with as little water, and, therefore, as little damage, as possible, to attain it every drop of water must be made to do its work instead of squandering itself uselessly and to the injury of property

It is usually best to place the engine as near to the water supply as possible, sufficient hose being laid down to reach the seat of the fire It is not advisable to get the engine very close to the fire, at least, to make any sacrifice in order to do this, especially in the case of manual engines, for the pumpers, if in any real or fancied danger, will work much less steadily than they would at a greater distance Of course, the less delivery hose there is on in a single stretch, the less friction has to be overcome, and the more easy is the work, but if, by adding another length of hose, a better water supply can be obtained, clearer or more copious, it should certainly be done The first few strokes of the engine should be made slowly, when the hose has been filled with water, and a jet appears at the nozzle, faster strokes may be made, and full speed attained In placing the engine care should be taken not to lay down the hose where it may be damaged, within the building, if it is to be taken upstairs, it should not be laid upon the stairs if it can be avoided, but upon the balustrades, where it is much less liable to injury

In laying down hose the coil is usually stood upon its edge and taken along towards the seat of the fire, or the point at which the stream is required, as it proceeds the coil will unwind itself and will be free from kinks or twists. It is necessary to avoid bends or sharp angles, and the hose should not be taken over heaps of rubbish or stones if it can be avoided The curves in the line should be regular, and formed in such a manner as to allow the stream of water to go forward without resistance The hose should not be placed on any sharp edge, which is liable to cut it, or at least to contract the water-way in working

When the branchpipe support is used, as it usually is with motor and steam fire engines, the branchpipe should not make a sharp angle with the ground, but the hose should be held off the ground for some little distance so as to make an easy bend

On the subject of friction in hose, it is well to remark that the friction increases enormously as the diameter of the hose is decreased, and as the quantity passed through it is augmented For instance, in a 100 yards length of hose, three inches diameter, with 150 gallons per minute passing through it, 16 lbs per square inch pressure is lost, in the same quantity 2¾ inches diameter, 25 lbs, and in the same quantity of 2½ inches, 40 lbs If 300 gallons per minute be passed through a single length, the number of pounds per square inch lost in 100 yards is 65, 101, and 162 respectively The necessity of using hose of the proper size is therefore apparent, and the advantage of working with more streams than one is also manifest For while 65 lbs per square inch pressure is lost when 300 gallons per minute are passing through a single line of hose, no more than 16 lbs per square inch is lost when this quantity is divided into two, the streams being re-united at the other end I may, perhaps, call the attention of those who wish to follow this subject further to the article on Friction in Hose in the Dictionary of Fires, etc, referred to on page 282, which is inserted as an appendix to the second edition of the "Fire Protection of Mansions"

The suction hose must be attached carefully, and the joint in the couplings made perfectly tight, the want of a leather washer or a faulty joint from any cause will vitiate the whole performance of the engine A leak in the delivery hose is comparatively unimportant, but in the suction hose it is fatal The fact that atmospheric pressure will not raise water more than about thirty feet, and that the vacuum generally obtained in the suction hose will not allow a lift of more than about four-and-twenty, with steamers and manuals, and twenty-seven with the motor-driven Hatfields, is generally understood; but I mention it here, having in mind a case where some fire brigade men, trying to get water from a well nearly forty feet deep, wondered why the engine did not work, and sent it up to the makers for examination. In taking water from a pond where the water is not deep enough to cover the strainer with two or three inches of water, a hole should be made sufficiently large to enable this to be done, and care should be taken to keep the strainer well below the surface Sometimes the engine cannot possibly be brought near enough to a pond to enable the suction to be used, the dam must then be filled by means of buckets, a line of men passing the buckets from one hand to the other, until the contents are emptied into engine or dam This means of supplying the engine, of course, will naturally be avoided wherever possible

To prevent the fire spreading is the first consideration (within the building, if possible, otherwise to adjacent property), to extinguish it is the second The second will begin to be accomplished the moment the first is completely attained The best way to enter a burning building is by the door, if it can be done, otherwise, through a window by external means The branchman must get where he can see the fire, and pour the water directly upon it, if he cannot enter the building, he should stand upon a ladder, or take up a position upon a building opposite, or at the side By some means he must get himself elevated to the same level as the highest point the fire has arrived at, so that he may see the water actually strike the burning mass, and may observe at once when enough has been applied The water should also be aimed at the highest point of the fire, the water, then, having done its work upon the burning material above, will fall below, extinguishing the fire as it does so Let me again observe that each drop of water should be made to do some useful work, if it does no good, it will certainly do harm At some fires, the reckless use of water and hand hatchets has done more damage than could possibly have been done by the fire, indeed, I once heard of a brigade which swamped out a three-storey residence, and spoiled some hundreds of pounds worth of furniture, when called to extinguish some burning rubbish in the basement Goods in floors below the seat of the fire should be protected by waterproof sheeting; if there is a salvage corps, this is, of course, its duty, but some brigades in towns where no salvage corps exists make this a part of their own work

Where a building of large dimensions is on fire, and the engines at the scene are of small capacity, should the fire once gain headway, the brigade will find some hard work cut out for it If, in addition, the water supply is limited, the case may become an exceedingly difficult one to manage Under such circumstances the bye-pass valve provided with steam and motor driven pumps may be used to great advantage If the engine is a manual, it is advisable not to take it to the water, but to place it as near to the fire as possible without endangering the pumpers, and to select that portion of the fire where the small quantity of water obtainable can do the greatest amount of execution, and the water should be taken to the engine in buckets, and poured into the cistern in the manner just alluded to In cases which sometimes occur where the fire is below the level of the water supply, the water may, perhaps, be made to flow from the supply towards the fire, and a hole dug in the ground will act as a dam for the suction pipe Where the supply is on one side of a hill and the fire on the other, the difficulty can be overcome by fixing a standpipe with sufficient hose attached to carry the water over the hill, it can then be allowed to run through open hose towards the fire If, again, the supply is taken from a pond, and there are two engines present, a good plan is to work one engine at the water to the top of the hill, whence the water can flow down towards the second engine, placed as near the fire as possible. Frequently complications of these difficulties will be encountered, and the responsible officer of a fire brigade can employ his leisure time with no greater profit to the community than by making himself acquainted with the various sources of water supply in his neighbourhood, so that he may be able to decide rapidly and rightly at a fire upon the best means to be adopted.

In regard to water supply arrangements in towns, it must not be forgotten that with a water company, the first consideration is the provision of the domestic and business supply for which it is paid, in most cases it has to furnish a supply of water for fire purposes without charging specially for it, as a *quid pro quo* for its monopoly For this reason, when fires occur in those parts of the town which contain many large warehouses and few residential buildings, it is usually found that the water supply is very deficient, the companies having laid down pipes large enough only for the supply for which they are paid Although, as it has been before observed, in those towns which contain a fairly efficient water supply at high pressure, it may be possible to extinguish many fires without the intervention of fire engines, there are, however, very few towns so favourably circumstanced, as, although in the chief parts the pressure may be good, yet, in outlying districts, where the largest buildings may possibly be found, the pipes will be small, and consequently the quantity of water available will be deficient

In working from mains in the street, the chief difficulty experienced is when the supply diminishes both in pressure and quantity As larger quantities of water become necessary at a fire, the fireman requires also a higher main pressure, a much higher pressure being necessary to send a large stream a certain distance than a small stream, and, of course, as a fire becomes larger, the heat renders it unavoidable that the fireman must attack it from a distance Consequently, it is a serious difficulty when, as it becomes necessary to open hydrant after hydrant, the fire streams obtainable are smaller in diameter and reach a less distance Steam fire engines are consequently always required at very large fires, there being no water system in any town, as far as I know, which is capable of giving a supply which would cope with a great conflagration by means of gravitational force alone

The officer in command of a brigade must make it his business to see that a clear way of retreat is open for the men within a building, and that they are in no danger from falling walls One man should never be allowed to go alone into a building where fire has made headway If the smoke is so dense that the men cannot stand erect for fear of suffocation, a stratum of fresh air is always to be found a short distance from the floor, and they can crawl upon their hands and knees without danger from this cause, and with little inconvenience It is to be remembered, however, that after a fire has broken through a floor, this supply of fresh air is not to be depended upon If danger be apprehended, a life-line attached to the belts of the men will enable them to be safely brought out should they become overpowered, and this simple precaution need never be omitted

Should it be necessary to enter a house by a window through which flame is bursting so as to prevent for a time an entrance being made, the water from the branch should be pointed in that direction, nearly perpendicularly, the water striking the ceiling will spread around and make an entrance possible

As soon as possible the larger apparatus, if it has been brought into use, must be dispensed with, that is to say, as soon as the fire is well under and can be kept sufficiently in check with less water than was at first necessary Water should never be thrown from buckets if a handpump can be had, not a half the contents of a pail thrown lightly upon the flames will go where it is wanted, while every drop from the nozzle of the handpump hose can be directed to precisely the spot where it is required, and will strike that spot with sufficient force to be of service

Agricultural fires require a somewhat different treatment from fires of any other kind If the brigade arrives at a farm before damage has been done to more than one stack, the chief consideration is to confine the fire to the stack already alight. For this purpose, those towards which the wind is setting should be covered carefully in with tarpaulins if they are to be had, otherwise with blankets or anything of the kind that comes to hand, and a considerable portion of the attention of the branchpipe should be directed to keeping these coverings wet. The burning corn or hay should be pressed together with hayforks; it is a fatal policy to open the stack and allow the burning embers to fly about the rickyard. Some farm labourers may be stationed at each stack to prevent it taking fire. All brigades which are liable to be called to country fires should take care to have a wicker strainer placed over the copper strainer at the end of the suction hose, the water supply at farms being almost invariably impure. If the fire is near the stables, and it is desirable to remove the horses, they should be harnessed if there is time, and their eyes bandaged with a wetted sack, smock frock, or whatever of the sort is handy, and led out as to work; they can then usually be got to a place of safety without much difficulty.

In dealing with fires at gas works it is frequently possible to make good use of the large quantities of ammoniacal liquor which are invariably found at such places. Ammonia is extremely light, being half the specific gravity of air; it is in itself slightly inflammable, although it is no supporter of combustion, consequently it forms a good extinguisher. Ammonia gas is usually soluble in water, one volume of the latter, under ordinary circumstances of pressure and temperature, taking up 700 or 800 volumes of the gas. At a very high temperature the ammonia might itself be decomposed. A disadvantage in using it is that, being lighter than air, it has a tendency to ascend and so to create a draught; notwithstanding this, however, it can be used, and has been used, with good effect. It should be remembered when dealing with ammonia that its effect on the lungs and eyes is most injurious, and that fatal results have ensued more than once The gas attacks the mucous membrane, and the consequent swelling of the air passages causes death from asphyxia, sometimes days after exposure to the gas

The fire stream may sometimes be simply impregnated with the liquor Some years ago I designed a simple arrangement for effecting this by mixing the liquor with the water, as it passes through the fire engine, in definite proportions, with this view, a special valve is arranged in a pipe in connection with the suction chamber of the fire engine At the end of this pipe is a screw, to which a small flexible hose can be attached, for lifting the liquor from the tank placed alongside the engine It is necessary, under ordinary circumstances, that about one gallon of liquor should be raised for every ten gallons of water, the valve, however, is provided with a screw, by means of which the lift of the valve can be adjusted, so as to give from the 10 per cent mentioned above to the smallest percentage of liquor To draw any given quantity, it is necessary to regulate the valve in accordance with the lift of the ordinary suction feed The working of the engine, of course, raises the water and the liquor at the same time, they are thoroughly mixed in the valve box, the liquor dissolves thoroughly, and a perfect mixture issues from the nozzle

In regard to proper sizes of nozzles to be used at fires, it is necessary to bear in mind the following facts —

Large streams can be conveyed, providing the pressure is equal, to a much greater distance than small streams, consequently large conflagrations, which cannot be nearly approached, can only be dealt with by large streams Spray, in contact with heat, becomes more or less vapourised, therefore, if the stream is not sufficiently compact, the water will be absorbed by the heated air before it passes to the seat of the fire, or the spray (which may be the whole of the broken volume of water) will be converted into steam, and will act as a blast to the fire For these reasons, fires in lofty buildings containing large quantities of inflammable materials will be quenched by a given quantity of water, projected through large streams, where the same quantity in small streams would be quite ineffective

But when the fire, even if a quantity of inflammable material is involved, is in such a position that the firemen can work above or on a level with the seat of the flames, so that the force of the stream is not greatly diminished before the seat of the fire is reached, then a number of small streams, or even spray jets, can be used with the best possible effect.

If a fire, under any circumstances, is spreading rapidly in more than one direction, it is usually thought advisable to use as many jets as the engine power available, and the water supply will furnish, but, if the fire is deeply seated in one spot, and is not extending in more than one direction, it is advisable to concentrate the power and water available in one stream

Supposing the power and water supply at the fire are practically unlimited, and the fire is burning intensely, the largest stream that can be obtained may be used with advantage, providing the place is so well alight that no damage by water is to be feared It is, of course, understood that in all cases the stream must be maintained at a pressure adapted to its size, a large stream at a low pressure, and a small one at a very high pressure being almost equally ineffective.

I will take a couple of instances illustrative of the usual English practice in fire fighting Suppose a large mill or warehouse in flames, the firemen unable to enter the rooms, the place more or less filled with inflammable goods completely in flames. In this case the officer in command of a brigade would use the largest jets the water supply and the engines at his disposal would allow From a good standpoint outside, every drop of the very large stream could be made to do some useful work upon the flames. All the water which reaches the inside of the building would absorb some portion of the heat generated, and would, therefore, do some useful part in extinguishing the conflagration The place being doomed to a total loss, damage by water is not to be apprehended

Suppose again a fire in the same building, but not raging so furiously as to prevent the firemen entering The fire upon discovery is burning upon the whole of the surface of the goods involved In this case, the object is to envelop the whole of the fire with water as quickly as possible, which is best accomplished by means of a number of small streams, or spray jets An excellent plan to adopt under these circumstances is to play a stream upon the ceiling, which spreads the water round, extinguishing the flames in every direction as it falls However powerful the pumping machinery available, and however copious the water supply, a good fireman will use small jets (many of them if the area covered by the fire is large), the object being to extinguish the conflagration with the least possible quantity of water.

A fireman will soon learn by practice what size of nozzle can best be used with his particular engine for the various purposes which, at one time and another, he may wish to fulfil, *e g* , which is best for attaining the greatest heights and horizontal distances, which is best for moderate heights in order to utilise all the water to the best advantage, and so on The jet which will give the maximum height with any given quantity or pressure is not necessarily the best nozzle for ordinary fire purposes

The subject of nozzles and fire streams is somewhat complicated, and the scientific aspects of the subject cannot be elucidated without the assistance of the higher mathematics, and of more elaborate formulæ than firemen care for in the ordinary way It has been fully dealt with in the *Dictionary of Fires, Fire Brigades, and Fire Appliances,* by Mr. Leonard Miller, under the head of Hydraulics, and in *The Fireman* for June, July, and August, 1886, so that I do not propose to enter upon it further in this place I may, however, give a short table of the sizes of nozzles most usually employed with the engines I have recommended to volunteer brigades

	One Stream	Two Streams.	Three Streams	Four Streams
0 Gallon Pump	1¼	each 1	each ⅞	each ¾
0 Gallon Pump	1⅛	,, ¾	2 ⅝ 1 ¾	,, ⅝
5 Gallon Manual	⅝	,, $\frac{9}{16}$		—

A practical difficulty which firemen often have to overcome in the course of their work is connected with fires at which a great quantity of smoke is present Sometimes smoke is so thick that a considerable time elapses before the exact locality of a fire can be ascertained, and the late Sir E M Shaw, in one of his works, relates an instance of a fire in which smoke was so dense, and beat so violently into the streets, that nearly twenty minutes elapsed, and ten or twelve engines arrived, some of them from stations three miles away, before the firemen with the first escape, or the officer with the first engine, could ascertain on which side of the street the fire was burning There are, of course, few fires at which anything of the kind occurs to this extent, but, during the early stages, smoke is often a very serious hindrance, and many firemen, at different times, have given attention to the safest and best methods of dealing with it

Perhaps it is hardly necessary to remark that smoke is made up of two combustibles, hydrogen and carbon, which, not having received their respective equivalents of oxygen from the atmosphere, pass away unconsumed The colour of the smoke depends very much upon the burning substance, as it varies in accordance with the quantity of carbon passing off in its pulverised dark condition A very familiar instance of the manner in which smoke is caused by imperfect combustion is that of a smoking lamp If the supply of air is interfered with, say by passing a rag round the air well, the flame at once becomes dull, the chimney smokes, and the unconsumed carbon is deposited in "blacks;" in the course of time the flame would be extinguished by smoke At a fire, in order to clear away the smoke, it is necessary to introduce a greater quantity of atmospheric oxygen, and this, of course, at the same time, by assisting combustion, intensifies the heat, it gives the firemen more work to do, while allowing them the opportunity of seeing how to do it

The practical question which has to be determined by fire brigade officers has to do, therefore, with the balance of disadvantages If the smoke can be completely confined within the burning apartment, the flame will of itself go out, as in the case of the lamp, because the flame cannot rise in an atmosphere densely charged with smoke Shall the fire be stirred up in order that it may be seen, or allowed to smoulder until it can be found in spite of the smoke, or is extinguished by the smoke itself?

Upon a subject like this, only the opinions of practical firemen of experience can have weight The late Sir E M Shaw gave the following details of his practice (I have slightly altered his own words to remove their connection with the context where it does not bear on the subject in hand) —"Hot smoke ascends, and cold smoke goes downwards, on this account we invariably endeavour, when working in smoky places, to make an opening at the top for its exit, and at the bottom for a supply of fresh air to replace it, and, at the same time, when it is possible, we light the gas and keep up the heat in every available way until the whole of the smoke has been removed by the current thus formed. If we neglect or are unable to do this while the smoke is hot, much inconvenience and danger may ensue, and goods of certain kinds—such as silks and other wearing apparel, groceries, spices, and almost all articles of food—are liable to be deteriorated in value almost as much as if they were burned It requires, of course, a considerable amount of discretion to determine the proper time for performing this important act of replacing a substance in which fire cannot exist by a supporter of combustion, but it is to be presumed that those entrusted with the important duty of extinguishing fires understand their business sufficiently to judge of the proportion between the end to be obtained and the means at their disposal, and will not admit air to increase the fury of the flames until they have first satisfied themselves that, either by being enabled to approach the flames, or in some other way, they are likely to obtain an advantage by doing so "

The late Mr Alfred Tozer, when Chief Officer of the Manchester Brigade, in a letter to me, made some exceedingly valuable remarks to this effect —" To the question, Is it risking complete destruction to admit air into a building on fire when the smoke is so dense that the firemen cannot see the exact spot to apply the water upon the burning material? my answer is most decidedly, No! Many scores of instances occur when firemen are compelled to admit air to allow the smoke to escape, so that the branchman can get as near as possible to the burning matter, and make certain that the water is applied direct upon the fire By way of illustration, let us take three cases, viz —

" A basement on fire, with a staircase at the further end of the room on the ground floor In such a case the firemen attach all the necessary appliances ready to meet any fire likely to occur within the whole building, next they break at least two openings in the floor leading to the basement near the doorway one of the openings will be comparatively free from smoke, and that generally is the nearest opening to the street door, ladders are passed through, the firemen descend thereby, hose in hand, and the result, in ninety-nine cases out of a hundred, is that the fire is immediately checked

"A fire at the extreme end of a long room with windows on one side only, and the staircase at the opposite end to the fire, with the smoke so dense that you cannot enter—some of the firemen crawl to the nearest window and open it or break the glass, having thus got a mouthful of fresh air, they go to the next and so on from window to window, other firemen at the same time dragging the hose after them until they reach the fire, when the order is given to turn on the water and the fire is extinguished In my experience this plan has never been known to fail

"A fire on the top floor of a long room—the smoke so dense that the firemen cannot enter—they get the necessary extinguishing apparatus ready at the door, with sufficient hose attached to lead to the entrance end of the room, whilst other firemen go on to the roof By placing their hands upon the slates, they will feel the heat more and more intense until they get over the exact spot where the fire is burning—several men then remove the slates, the heat, smoke, and perhaps the fire ascends, at the same moment the firemen can enter the room and breathe freely—the water is turned on, and success is certain"

In entering a room charged with smoke firemen are compelled to exercise very great care It often occurs that there is not oxygen enough in the atmosphere of the burning building to keep their hand-lamps alight The men must then go forward with great circumspection Many accidents have occurred in the course of discovering the whereabouts of a fire under such circumstances as these, through falling down openings in the floors, such as staircases, trap-doors, and hoists The safest method is to advance by sliding the foot slowly and cautiously along with the body inclined backwards, or to crawl forwards upon hands and feet A pocket handkerchief or a piece of waste held between the teeth will help to cool the smoke and purify the air passing into the lungs

Even more difficult to deal with than smoke is "back draught" as the Americans call it

By "back draught" is meant a sudden outburst of flame generated by the heat when highly inflammable materials are more or less on fire It is frequently seen at fires, especially when a large bulk of material is broken by falling down or over, then the whole bursts into flame It is not, in reality, a "back draught" at all, but the explosion of a bottled-up accumulation of highly inflammable vapour, the smoke issuing a moment or two before the outburst is usually black and then gives place to a sudden outburst of flame the gases rapidly expand, sometimes with such force as to burst out windows and force out walls This often occurs at carpenters' workshops, cotton mills, and warehouses

Firemen very often have to contend with and retreat from a real "back draught" That is to say, if they are working up a staircase into or near to the entrance to a room on fire, when a window or windows on the opposite side to the staircase, or a skylight in the roof is broken, the cold air rushing in through the windows or skylight drives the heated air and smoke, and sometimes the flame, in the direction of the staircase The firemen would then have to beat a hasty retreat I remember two firemen losing their lives at a fire in Meal Street, Manchester, through a stack of cotton goods falling over when on fire The firemen were working their way up the staircase of the burning building, when the stack fell over in the room above where the men were at work Some of the goods fell down the staircase, after bulk was broken, the whole instantly burst into flame, one fireman was burned to death on the stairs, another died in the hospital a few days after, through inhaling the heated air and from burns, and a third was severely burned about the face and hands, but afterwards recovered

"A few years since," to quote the late Mr Alfred Tozer once more, "I attended a fire at a very large and old cotton mill, six floors high and about 150 yards long On my arrival the three top floors at one end of the mill were on fire for about one-third its length The floors were thoroughly saturated with oil, and dense volumes of black smoke were issuing from all the windows of the three floors About five minutes after my arrival the wall at the extreme end of the mill, and farthest from the fire, was forced out for four floors and fell into the roadway I was of opinion at the time that the fall of the wall was due to the rapid expansion of the gases, generated by the fire at the other end of the premises It is no uncommon thing to see at a fire plate-glass windows forced out in this way, but the action appears to me to be the very reverse from a 'back draught' It is true that a real 'back-draught' is annoying and dangerous to firemen in the performance of their duties, but it always occurs when the cold air is admitted, which drives the heated air and flame in an opposite direction"

Probably the fatal fire at Exeter Theatre was due to "back draught" In this theatre, at one corner at the back of the stage, was a large door which opened to the street, this door was used for taking in and out scenes, and was named the scene dock Mr Phipps, the architect of the theatre, attributed the rapidity of the conflagration to the circumstance that the huge scene door of the dock was opened, thereby creating a powerful draught, which blew the act-drop, when lowered, into the auditorium There is no doubt that this was the cause of the rapid spread of the fire The cold air rushing in at the back of the stage would drive the heat, smoke and flame, in the same direction that the curtain was blown, that is, towards the front of the house, and the heated air and smoke would, in all probability, suffocate a great many of the people even before there was time to reach the staircase, especially in the upper parts of the building

Inflammable liquids in a state of combustion are objects of apprehension to most firemen; the difficulties experienced in fighting such fires are considerable, and are of a character quite different from those of the classes of fires with which firemen are most acquainted. The means for putting out ordinary fires are all but inoperative when inflammable liquids of a lighter specific gravity than water have to be dealt with The effect of pouring a quantity of water upon them is only to spread the danger, unless sufficient water can be forced into them to reduce the temperature below their own boiling point Usually, long before this has been accomplished, the burning oil or spirit has overflowed the sides of the vessel which contained it, and, floating on the top of the water, has carried destruction wherever it could reach In some cases, especially when water has been poured against the hot sides of a vessel, the latter has suddenly burst, with disastrous results Sand or earth is very efficacious for use at such fires to divert the burning streams of liquid into safe channels

There is another difficulty which is frequently met with in the course of practical work, which arises from the extreme height to which buildings are now carried The ordinary fire escapes and manual engines are of small value when flames are bursting out of the windows of a five or six storey building In some towns, years ago, it used to be pretty generally accepted that when fire had got hold of a very large or very high building, its destruction was inevitable, and the firemen were secure from criticism should their efforts from the first be directed to saving adjacent property Now, in some of our largest cities where the largest buildings are, the turntable escapes, to which I have referred in a previous chapter, when used as water towers, enable firemen to attack with effect a fire on the top storey of our highest warehouses High structures, such as the cathedrals at Canterbury and Lincoln, not infrequently are provided with stationary plant of their own. But even in places where the brigade has no turntable escape, and the high buildings are not provided with stationary plant, the powerful motor pumps which are now made, are able to perform the work which was impossible years ago for manuals and small horse-drawn steamers One of these machines recently threw a 1½ inch jet to a height of 200 feet, a performance which was quite unthought of ten years ago

A casual glance at the kind of buildings which are now almost exclusively run up for manufacturing and warehousing purposes would lead one to expect anything but diminution of the fire loss Take a single class of buildings —flour mills All the new mills are made to work under the American roller system, which, for economy's sake, necessitates a tall building of say six storeys The architect designs the building apparently for the express purpose of including all—mill, warehouse, stive-rooms, and engine-house—in one risk A slight explosion of dust, a little oil on a piece of old rag, a little undue friction in the elevator head, there is a small flash first, and in ten minutes it has become apparent that nothing can be done to save the mill Cotton mills, oil mills, warehouses of all kinds, and other classes of buildings are all liable, as at present built, to total destruction when fire has once broken out in them It is not only that they are built of materials distinctly unfavourable to a "good stop," but the great height of the whole and the size of single compartments have a similar tendency

Where the three features of bad materials and excessive height and area are found in the same building, firemen need every possible assistance which good and powerful machinery can give them Notwithstanding they may be equipped in the best possible manner, their efforts must often be doomed to failure I am bound to say that the safety of any building of abnormal proportions depends more largely upon the superiority of its construction throughout, than upon any other circumstances Still, a fire brigade can do much even when flames have obtained a hold, if they have the proper tools for the purpose

The fire protection of the upper portions of tall buildings should be considered as belonging, to a certain extent, to the owner All above forty feet from the ground ought to be his own particular care Provision for the saving of life and property should both be made by him This is not so difficult a matter as it at first appears to be, if a moderate outlay is not objected to An excellent device for facilitating the application of a powerful jet of water in the upper parts of mills and warehouses is in use in several of the towns in the cotton district, which might profitably be applied more than it is at present An iron pipe is carried from the top to within about thirty feet of the ground level, where it terminates in a connection for hose, which is protected by a small box On each floor outlets with hose connections are attached to the pipe On an outbreak of fire it is only necessary to attach the delivery hose from the engine to the bottom connection and to take a short length of hose and branchpipe to the best position for grappling with the fire, and connect up to one of the outlets on the pipe The firemen are then in a much better position than they would be if they had to drag a long length of hose up the fire escape, and it is possible to bring into use engines of a power which would render but small assistance under other circumstances in dealing with fires upon the upper floors In many mills a ladder is carried up by the side of the pipe, terminating in a landing on each floor, which is useful for a fire escape Where connections have been made with a high-pressure water service, or a water tank is fixed on the roof of a high building, the pressure in the main pipes in the top storeys may be increased by mechanical means

It appears reasonable that owners of high buildings should be compelled to provide some such assistance as the foregoing, with the view of enabling the brigade to get properly to work immediately upon their arrival Insurance Companies would do well to insist upon such provision being made before settling their policies Although it is the duty of the local governors of every town to arrange for its efficient protection against fires, yet owners of specially dangerous risks have also a duty to perform in this direction as far as their own property is concerned

There are a few special risks in fire fighting, against which a fireman should always be on his guard First, electricity The electric current should be cut off as early as possible by the main switch, which will always be found in basement of a building close to the main fuses Should this switch be damaged by the fire, the Power Supply Company should be notified as soon as possible When fire occurs in a street in which there are overhead wires, the branch man must be very careful that his jet does not play on them Water should never be used for extinguishing an electric arc, preferably, earth or sand should be used, and if not, it should be beaten out with a rug or mat

A gas flame should never be extinguished except by turning off at the meter

Great care should be observed in premises where carbide of calcium is stored If water comes into contact with this, acetylene gas is evolved, and there is danger of a violent explosion

It should be remembered in dealing with premises in which sulphuric, nitric, and hydrochloric acids, or ammonia are stored, that the fumes emitted by these substances are most injurious and have cost many lives

CHAPTER XIX.

SAVING LIFE

GENERAL REMARKS ON SAVING LIFE—METHOD OF USING FIRE ESCAPE—SEARCHING A BURNING BUILDING—PLACING PEOPLE IN THE CHUTE—SAVING PEOPLE BEYOND REACH OF THE LADDERS—USING LIFE LINES—USING JUMPING SHEETS—USING POMPIER LIFE-SAVING APPLIANCES—ROCKETS AND GUNS FOR FIRING LIFE LINES

Although the usual work of a volunteer fireman is to save property—and, in a provincial town, he may be connected with a brigade many years before he has to deal with a fire at which life is endangered—it must always be considered that saving life is the most important part of his duty

Upon the organisation of a new brigade, no time should be lost by the members in making themselves thoroughly acquainted with the manner of using a fire escape, the best methods of proceeding when life is endangered, and with the many devices which can be made available upon emergencies

It will be well if every member is competent to take charge of the escape without the assistance of other trained men At any time he may be called upon to act at once with the help only of casual passers What chagrin, I would ask, could exceed that of a fireman unable, at such a moment, to respond to the call of duty, if a life or lives should be lost in consequence of his incompetence or bungling?

The escape, if of the vertical-running pattern, when at the station should be pitched against the wall, unless there is a tower specially provided for its reception, it can be secured by placing blocks of wood under the wheels, which, on an alarm being given, can easily be kicked away, or, if this cannot be done, it should be fastened by means of a chain attached to the hand iron of the carriage lever, to a ring in the wall or some other suitable object, such as a railing, there will, of course, be a snap hook upon the chain to facilitate fastening and unfastening In windy weather the escape must be lowered, but care must be taken that under any circumstances there is no difficulty or delay in getting away An escape constructed to be run horizontally, being much shorter when the ladders are lowered, will usually be kept within the station

Upon receiving a call to a fire in the town the first-aid machine carrying the escape should get away first If the escape is not carried on any of the machines it should be at once dispatched, whether it is apprehended that its services will be required or otherwise Unless the machine is of very heavy construction, a trained fireman, with one man's assistance, will be able to propel it along the streets in ordinary weather A fireman should not attempt to move the escape without the help of at least one man, which must always be available, further assistance will certainly be forthcoming as they proceed to the fire

Upon arriving at a fire, the first duty of the fireman in charge is to attend to the safety of his machine, which if vertical running should not be left standing in the middle of the street, but should be pitched against the nearest available house or wall He should then thoroughly search the building to see whether there are any persons within it, this should always be done when possible, unless the fireman has received the positive assurance of the head of the family or some responsible person that all who were in the building are already safely out

For the purpose of searching a building, the firemen should use the stairs whenever it is possible to do so. No doubt it appears to be a much more glorious enterprise to rush up a ladder with a hatchet and dash into a room from the outside; whenever this is necessary it must be done, but the course of action endangers the place, and if there are any persons in the top or back, it renders them liable to almost certain destruction The best way for the fireman to carry out this most hazardous part of his duty is to enter by the door and go by the stairs to the top of the building, being careful to attach a life-line to his belt, and, beginning at the top, to explore the rooms and passages as rapidly and completely as may be, working his way gradually to the bottom

If the fireman cannot enter by the street door, he should not ruthlessly hack away the frames of a window with his hand axe, if he break a pane near the hasp he can open the window, and by closing it after him he may considerably reduce the danger to the building and inmates If he wishes to clear the room of smoke, he may break another small piece of glass below or above the first opening, which will be effective As mentioned elsewhere, to breathe in a room full of smoke, the advantage of keeping the head as near the ground as possible is well known, a pocket handkerchief, dipped in water, will make a tolerably good respirator if a better is not available

Should trustworthy information have been obtained that all the persons are in one room, or one set of rooms, the fireman will, of course, at once proceed there; otherwise he will use his discretion as to his immediate action If he observes them at a front window, and knows that exit by means of the stairs is cut off, he should at once pitch the escape, placing the top of the highest ladder so that it reaches just below the window The fireman will then ascend the escape, enter the room, and pass down the inmates, by the ladder or by a line, according to the age and sex of the endangered persons, and other circumstances He should not, as a rule, endeavour to take them down the ladder upon his back, if he does he must be careful to get upon the floor where they are to place them in position, on no account trying to do this while upon the ladder, he should then, carefully balancing himself, especially at the moment of placing his weight upon the ladder, get upon the machine with the greatest circumspection, and descend with his feet as wide apart upon the rounds as possible

Chutes are not now carried on fire escapes, but in order to place persons in a chute when there is one available, the fireman should first lay them face downwards upon the floor, then raising them gradually, he should throw them across his shoulders, and ease them gently, face upwards from his shoulder, into the chute Women are usually sent down head foremost, so that their clothing may not catch in the chute, men either way The rule is to send down first the women and children, and afterwards the men, but circumstances frequently occur in which this is impossible, and the fireman must use his own discretion Unfortunately, persons in a situation of danger have very seldom full command over themselves, or any command at all, and if the fireman is not self-contained and resolute, serious difficulties may be placed in the way of successful action He must, therefore, above all things, act promptly and courageously, and insist upon the most implicit obedience to his commands, because if he hesitate, or shew signs of pusillanimity, he will throw away his chance of usefulness, or at least greatly diminish it

When in the course of a search made upon arrival the fireman discovers that there are people in the upper storeys of the building beyond the reach of ladders, he is face to face with the greatest difficulty incident to his profession Human life then depends solely upon his knowledge, ingenuity, and resource, it is incumbent upon him therefore to acquire the first by all the means in his power, the latter are personal qualities which no fireman should be without

There are several ways in which persons so circumstanced may be rescued.

First, it may be possible to break through the wall of an adjoining house, and this may be at once tried, either by a fireman or bystander A crowbar is all that is necessary for the purpose, the walls of the upper parts of houses are not very thick, but probably ten minutes at least will be necessary to obtain an opening A small hole should be made first, when the crowbar is once through, the rest will be easy The inmates will, of course, be taken out by the way in which the fireman enters

At the same time an attempt may be made to obtain an entry through the roof The fireman may be able, through the trap of an adjoining house, or otherwise, to gain the roof of the burning building He may then enter by the dormer window, or the trap, or if by neither of these means, by removing the slates or tiling, and the inmates may be brought up through the same opening

Or a line may be passed either from the roof above, or from an adjoining roof, to the endangered persons, and they may be raised or lowered as circumstances require To do this some little experience and practice are necessary If a fireman has a competent assistant with him, who thoroughly understands what is going to be done, he should get himself lowered to the necessary level, and place the inmates of the house in a chair knot, allowing his assistant to raise or lower them one at a time, while he retains an end of the rope, by which he can guide the persons clear of window sills or obstructions, and also recover the knot After all the inmates have been passed out in this way, the fireman can himself be hauled up But if he has no assistant in whom he can place confidence, the fireman should remain upon the roof, and call to his aid any person available, he should pass the line round a chimney stack, or other fixture, to relieve the hands of the persons holding the rope from the direct pressure of the load, and should merely leave them to haul in the slack while he himself hauls up the persons to be rescued In these circumstances, he will do well not to trust them in a chair knot, but should lower a running bow-line or other slip knot, which will close on the person round whom it is placed, if he lowers the knot loose they will at once *see* what they ought to do to avail themselves of the assistance afforded them If the circumstances admit of the fireman giving directions, he should instruct the person to be rescued to place the knot underneath his arms, draw it tight, and hold on with the hands to the line outside the knot, this will keep his head upwards, and the whole body in a safe position during the operation of hauling or lowering him

Should there be no means of getting upon the roof of the burning building the case is a bad one, but is not even then entirely hopeless The fireman may be able to get to some part of adjoining premises above the level of the window where the endangered people are He can then lower a line to the street, and his assistants can carry the end in such a direction as to bring a part of the line across the window The fireman above may then take a turn of the line, the persons to be rescued may get upon it one at a time, and the end below being hauled out clear of burning windows or other dangerous places, the persons may be removed, they may either be taken into the windows of adjoining houses or lowered to the street level, as most convenient This, it will be seen, requires an effort on the part of the persons in the house, who may be paralysed by fear, or otherwise incapable of making any, it is therefore advisable, whenever possible, for the fireman himself to go down on the line, and place the persons safely in a chair knot from which they cannot fall It is to be noted that when both ends of a line have to be hauled taut, a slip knot would render, so that in such cases the use of a chair knot or some other fixed knot is compulsory Whenever the fireman can reach the room and himself place the inmates safely in, a chair knot may always be employed in preference to any other

A line may be thrown to the persons in the room if it is considered they are likely to have presence of mind enough to assist themselves, by making an end of it fast to a bedstead, etc, they may descend in safety The persons below will, of course, watch to receive them, and will manipulate the line so as to clear it of flames or obstructions

In narrow streets many devices may be made available. A line may be thrown across, and the persons in danger hauled out direct, if care be taken to break the blow This may be done in many ways, such as by holding a preventer from a higher window or the roof to check the blow, holding a mattress or some other soft substance upon the wall against which they are to fall, or by so adjusting the line that they will fall towards an open window, at which they may be caught in the arms of people standing inside the room Or a plank, pole, or ladder may be placed from an opposite window, and the inmates may walk or creep across, care being taken to throw a small line across first, so that they can make it fast to them, it being very possible that they may lose nerve in crossing, and either stop in the middle or fall off In most houses it will not be possible to take up a ladder or large plank inside, but there can be no difficulty in hauling either up from the outside, by a line let down from the window or roof of the house opposite the burning building

But if all the foregoing are, from one cause and another, impossible, there is still a last resource in the jumping sheet which should be in the possession of every fire brigade, it should always be understood, however, that this article is nothing more than a last resource—not to be applied while any better remains available The jumping sheet is, perhaps, safer than the expedient of hauling out the body direct, which could seldom be done without severe injury The jumping sheet should be held by as many persons as can get hands to it, and at about three feet from the ground; the strongest and most experienced men, such as firemen or policemen, should be placed at the corners The men who are holding the sheet should stand with their feet forward, their heads and bodies thrown well back, and their arms at full stretch, and should take hold of the beckets by both hands Underneath the sheet a truss of hay, a bed, carpet, or other soft substance should be placed, so that the fall may be broken as much as possible, it being extremely probable that, even when every precaution has been taken, those who are holding the sheet will be unable to support it against the strain caused by a heavy body falling a considerable height

It may be useful here to describe the system of working the "Pompier Life Saving Appliances," which were mentioned in Chapter X The appliances are manipulated by a corps, composed of captain and at least six members, who are equipped, as I observed, with single beam scaling ladders, safety tube, and grip sack and life lines

Each man is dressed in a light plain uniform, and has a belt with a snap hook and hand hatchet attached This gear has nothing whatever to do with the extinguishing of fires The only object of the corps is to arrive on the scene as soon as possible, and to devote themselves exclusively to the saving of life On arrival, the captain immediately ascertains if there are any persons in the burning building, the other members meanwhile remain with their apparatus ready for instant action

In case there is only one person to be saved it is done by the rope, after building a chain of ladders to the imperilled person The chain must be built with discipline No jostling or pushing or trying to get there first must be allowed At the short command, "Ready for Work," every member repairs to the respective place where the chain is to be built, the leader building first, followed by the next regular members, and should the leader be absent, No 2 takes his place All this is done without unnecessary talk, as this involves loss of time, and in cases of this kind every second counts.

Should there be old and feeble persons or children to be saved, the tube is resorted to; but as a last resort, where every avenue of escape is cut off to reach those imperilled, the grip sack, corresponding to the English jumping sheet, is used

If no lives are to be saved, and the fire is in the upper floors of the building, the members of the corps should not look for stairways to get at the fire, as it can be done a great deal more quickly by building a chain of ladders, the first man up opening the window, the second man lowering his rope, to which a pipe is fastened, and hauling up the line of hose, the rest of the men snap themselves to their respective ladders, and help ease up the hose to those above, when the line is up they follow up to their partners

If a "pompier" is cut off and cannot get back, he notifies the fact by a shrill blast of his whistle, and then is the time for his comrades, whose duty it is to save him

After leaving a fire, every part of the apparatus must be examined and looked after, and put in its proper place, to avoid being lost The ropes, grip sack, and tube, must be well dried if wet, the ropes tested once a month, and must bear the weight of 600 lbs

Several attempts have been made at various times to develop the idea that lives may be saved at fires by means of rockets carrying up to endangered persons a line by means of which they may haul up a ladder or some other means of escape Of course, the employment of rockets by the coastguard service for saving lives at sea has often been attended with very satisfactory results "Low and Duff" guns may be found amongst the equipment of several brigades, and are useful when it is required to throw ropes to windows or over a high wall in order to enable the firemen to bring it down in a direction of safety. The late Mr Braidwood, when in command of the Edinburgh Fire Brigade, used a steel crossbow for throwing lines over high detached buildings, he attached a small cord to a lead bullet, weighing three ounces, which could be thrown by the bow to a height of a hundred and twenty feet By means of this cord a stouter line was first drawn up, and then a chain ladder In Manchester a common blunderbuss has been used for some time for the purpose of breaking windows in high buildings

I may remark generally that a fireman should leave nothing untried, while any device or expedient can be thought of, to save persons from perishing by fire It is far better to sacrifice their lives in trying to save them than to leave them to a certain horrible death

CHAPTER XX.

ACCIDENTAL INJURIES AT FIRES

THE ST JOHN'S AMBULANCE ASSOCIATION—SIGNS OF FRACTURE—SPECIAL FRACTURES—HÆMORRHAGE—BURNS AND SCALDS—ARTIFICIAL RESPIRATION—INSENSIBILITY—ASPHYXIA

As firemen are at all times liable to accidental injury, and not unfrequently have also to attend to people who have sustained injuries at fires, they can learn much that is specially valuable to them by an attendance at classes formed under the auspices of the St John's Ambulance Association A large number of firemen hold the certificate of this Society

By the kind permission of Colonel Sir Herbert C Perrott, Bart , C B , the Chief Secretary of this Association, I am able to append some extracts from their official "First Aid to the Injured" text-book, which contains valuable hints for dealing with such injuries as are most likely to be encountered at fires While I have included these for the sake of completeness, I should be sorry if their insertion here were to give the impression to any fire brigade that it is only necessary to master these simple facts, and that the course of practical training under the Association is superfluous So far from this being the case, it is absolutely necessary to *see* what has to be done, and the best way of doing it, if valuable help is to be rendered to injured persons

It will be noticed that the object of the following directions is to enable "first aid" only to be rendered on the spot The remedies are, therefore, of such a nature as are likely to be readily accessible in all cases It may be well, especially in the case of brigades which run to country districts, to carry a few simple remedies, such as those mentioned in this chapter, in the tool-box of the fire engine. Any surgeon would assist the brigade in making a selection The cost would be small, and at some time or other they are certain to prove invaluable

Fractures—General Signs and Symptoms which may be Present

A fracture of the femur, humerus, or both bones of the forearm or leg, affords the most complete example

1 *Pain* at or near the seat of fracture

2 *Loss of power* in the limb

3 *Swelling* above the seat of fracture Swelling frequently renders it difficult to perceive other signs of fracture, and care must therefore be taken not to mistake a fracture for a less serious injury

4 *Deformity* of the limb The limb assumes an unnatural position, and is mis-shapen at the seat of fracture The contracting muscles may cause the broken ends of the bone to override, thereby producing shortening

5 *Irregularity* of the bone If the bone is close to the skin the fracture may be felt, and if compound it may be seen

6 *Unnatural mobility* Movement may be made out at the seat of fracture

7 *Crepitus*, or bony grating, may be felt or heard when the broken ends move one upon the other

The last two signs should only be sought by a doctor

Apparatus for Treatment of Fractures

Splints and bandages for first aid frequently have to be improvised

A splint may be improvised from a walking stick, umbrella, billiard cue, broom or brush handle, policeman's truncheon, rifle, folded coat, piece of wood, cardboard, paper firmly folded, a rolled-up map, or, in fact, anything that is firm and long enough to keep the joints immediately above and below the fractured bone at rest When the above appliances are not available, the upper limb, if fractured, may be tied to the trunk, and in all cases a fractured lower limb should be bandaged to its fellow

Bandages may be improvised from handkerchiefs, belts, straps, braces, neckties, or any piece of linen, calico, string or cord that comes to hand

General Rules to be Observed in the Treatment of Fractures

The object of first-aid treatment of fractures is to guard against further mischief, and especially to prevent a simple fracture from becoming compound or complicated To attain this end —

1 *Attend to the fracture on the spot* No matter how crowded the thoroughfare, or how short the distance to a more convenient or comfortable place, no attempt must be made to move the patient until the limb has been rendered as immovable as possible by splints or other restraining apparatus

2 *Steady and support the injured limb at once*, so that its further movement on the part of either the patient or bystander is prevented

3 *Straighten the limb with great care*, and if shortening is observed in the case of a fracture of a bone of the lower limb, pull upon the foot until the limb regains a more normal length When the shape of the limb is improved, on no account let go until it is secured in position by splints, otherwise there is great danger of the fracture becoming compound or complicated

4 *Apply splints (when practicable) and bandages* as follows —

(*a*) The splints must be firm, and long enough to keep the joints immediately above and below the fractured bone at rest They should, if practicable, be padded to fit accurately to the limb and be applied over the clothing (*b*) The bandages must be applied firmly, but not so tightly as to constrict the circulation of the blood in the limb When the patient is in the recumbent position double the bandage over a splint to pass it under the trunk or lower limb

In applying bandages near a fracture the upper one should be secured first

5 *When hæmorrhage accompanies a fracture* it must be attended to first, and the wound covered by a clean dressing

6 *No attempt must be made to remove a patient suffering from a fracture of the spine, pelvis, or thigh, except in a recumbent position,* preferably on a stretcher

7 *In every case of fracture it is necessary to cover the patient to keep him warm,* and so lessen the effects of shock of the accident

8 *In all doubtful cases* treat as a fracture

Special Fractures

Fracture of the cranium If the upper part is fractured the signs are swelling, irregularity, and frequently insensibility, either immediate or coming on gradually If the base is fractured insensibility may come on immediately, blood or a clear fluid may issue from the ear channel, blood may escape from the nose, or it may pass down to the stomach, whence it may be vomited, the fracture may involve the orbit, causing a blood-shot eye

Treatment Injury to the brain is the great danger attending a fracture of the cranium For treatment see "Concussion and Compression of the Brain" in "First Aid to the Injured"

Fractured ribs The ribs usually fractured are the sixth, seventh, eighth, and ninth, and generally the fracture is midway between the breast-bone and the spine

Evidence of the fracture is afforded by pain, especially on attempting to take a deep breath, and by short and shallow breathing. If the lungs are injured, blood, frothy and bright red, may be coughed up and expectorated

Treatment (*a*) When the fracture is not complicated by an injury to an internal organ --

1. Apply two broad bandages round the chest sufficiently firm to afford comfort, with the centre of the first immediately above, and that of the second immediately below, the fracture The lower bandage should overlap the upper to half its extent The knots are to be tied rather to the front on the opposite side of the body Another good plan is to apply a strong towel, folded about eight inches wide, tightly round the chest, securing it with three or four safety pins
2. Place the arm on the injured side in a large sling

(*b*) When an internal organ is injured

1. Do not apply bandages round the chest
2. Lay the patient down, inclined a little towards the injured side
3. Loosen the clothing, give ice to suck, and place an ice bag over the seat of injury Treat as for internal hæmorrhage
4. Place the arm on the injured side in a large sling

Fracture of the collar-bone (clavicle) This fracture is frequently caused by a fall on the hand or shoulder. The arm on the injured side is partially helpless, and the patient usually supports it at the elbow with his hand, and inclines his head towards the injured side The fractured ends can generally be felt to overlap, the outer fragment being the lower The general signs and symptoms of fracture are mostly present

Treatment 1 Remove the coat and as much more of the clothing as is expedient

2 Place a pad, about two inches thick and four inches across, in the armpit.

3. Gently bend the forearm well up, keeping the shoulder as far back as practicable, and support it in a "St John" sling, made as follows.—

(*a*) Lay an unfolded bandage across the chest over the injured limb with one end on the injured shoulder, and the point beyond the elbow on the injured side

(*b*) Pass the lower end of the bandage under the injured limb, across the back, and tie the ends somewhat loosely in the hollow in front of the sound shoulder

(*c*) Fold the point over the elbow of the injured limb and secure it by one or two pins

4 Tightly secure the injured limb to the side by a broad bandage passed round the elbow and trunk, so as to lever out the shoulder, the pad forming the fulcrum

5 Now tighten the sling

When both collar-bones are broken keep the shoulders back by narrow bandages tied round each arm, close to the shoulder, passed across the back, over the opposite arm, and tied together in front The forearms should be raised and supported by the bandages

Fracture of the forearm When both bones (the radius and ulna) are broken, the general signs and symptoms of fracture are usually present When one of the bones only is broken the signs and symptoms are as a rule pain, loss of power, swelling and irregularity

Treatment This is the same, whether the fracture is of one bone or of both

1 Bend the forearm at right angles to the arm, keeping the thumb upwards and the palm of the hand towards the body

2 Apply broad splints on the inner and outer sides from the elbow to the fingers

3 Apply bandages, embracing both splints, immediately above and below the fracture and round the hand

4 Apply a large arm-sling.

Fracture of the thigh-bone (femur). The thigh-bone may be broken at its neck, anywhere in the shaft, or close to the knee A fracture at the neck is likely to occur in old people from very slight injury, and is often difficult to distinguish from a severe bruise of the hip, but it may be assumed that when, after an injury near the hip joint, the patient cannot, when lying on the back, raise the heel from the ground, the bone is broken All the general signs and symptoms of fracture are usually present, and a prominent sign is the position of the foot, which, as a rule, lies on its outer side Shortening may vary from one-half to three inches

Treatment 1 Steady the limb by holding the ankle and foot

2 Gently draw down the foot and bring it into line with its fellow When two or three assistants are at hand it is one person's duty to hold the foot in position until the splints are secured

3 Apply a splint on the outer side from the armpit to beyond the foot

4 Apply a splint on the inner side from the top of the thigh (the fork) to the knee

5 Secure the splints by bandages as follows — (*a*) Round the chest just below the armpits, (*b*) round the pelvis on a level with the hip joints, (*c*) above the fracture, (*d*) below the fracture, (*e*) round the leg, (*f*) round both ankles and feet, and tied below the feet, (*g*) a broad bandage round both knees

When single-handed, or when the patient is a woman, it is expedient, after extension of the limb, to tie the feet together, dispense with the inner splint, and pass the bandages round both limbs

Fracture of the knee-cap (patella) Pain, loss of power (the limb will be quite helpless), and irregularity (a gap may be felt between the broken fragments of bone) accompany this injury

Treatment. 1. Lay the patient on his back, raise well and support the head and shoulders, straighten and raise the limb

2 Apply a splint along the back of the limb, reaching from the buttock to beyond the heel

3 Apply a narrow bandage with its centre immediately above the knee cap, cross the ends behind over the splint, and tie in front below the broken bone To ensure firmness apply a second bandage in a similar way, but commenced below and tied above the broken bone

4 Further secure the splint by bandages round the thigh and leg

5 Support the foot well off the ground by a pillow, roll of clothing, etc , or if none of these are at hand by resting it on its fellow

6 Apply an ice bag or a cold water dressing over the fracture

Fracture of the leg (tibia and fibula) One or both of the bones may be broken When both bones are broken all the general signs of fracture are usually present, but when one bone only is broken deformity is not always noticeable A fracture of the fibula three or four inches above its lower end is frequently mistaken for a sprain and sometimes for a dislocation of the ankle

Treatment 1 Steady the limb by holding the ankle and foot

2 Draw the foot into its natural position, and do not let go until the splints have been fixed

3 Apply splints on the outer and inner sides of the leg, reaching from above the knee to beyond the foot If only one splint is available place it on the outer side

4 Secure the splints by bandages—(*a*) above, (*b*) below the fracture, (*c*) immediately above the knee, (*d*) round both ankles, (*e*) a broad bandage round both knees

When single-handed, or when the patient is a woman, after extending the limb tie both feet together, dispense with the inner splint, and pass the bandages round both limbs When no splint is available tying the legs, ankles, and knees together is of great service.

Dislocations

• A dislocation is the displacement of one or more of the bones at a joint

The joints most frequently dislocated are those of the shoulder, elbow, thumb, fingers, and lower jaw

Signs and Symptoms of Dislocation.

1 *Pain* of a severe sickening character at or near the joint

2 *Loss of power* in the limb

3 *Numbness* of the parts below the seat of dislocation

4 *Swelling* about and below the joint

5 *Fixity* of the joint The limb cannot be moved at the joint by either the patient or others

6 *Deformity* of the limb The limb assumes an unnatural position, and is mis-shapen at the joint

Treatment

No attempt should be made by anyone except a doctor to reduce a dislocation Pending his arrival —

Support the limb in whatever position gives most ease to the patient, bearing in mind the necessity of lessening the effects of jolting during transport

Treat for shock (see later)

Hæmorrhage

Hæmorrhage, or bleeding, is of three kinds

1 Arterial 2 Venous 3 Capillary

Arterial Hæmorrhage

1 Blood from an artery is scarlet

2 If the wounded artery is near the skin the blood spurts out in jets corresponding to the pulsation of the heart

3 The pressure point (see below) is on the heart side of the wound.

Arrest of Arterial Hæmorrhage.

Arterial hæmorrhage is, when practicable, to be arrested by pressure, position of the body, and elevation of the bleeding part

Pressure may be —

1 *Digital*—that is, applied with the thumb or fingers, and may be (*a*) on the wound, (*b*) at a spot called the pressure point The pressure points are indicated by numbered dots on the frontispiece

2 *By a pad and bandage* (tourniquet), (*a*) on the wound, (*b*) on the pressure point

3 *By flexion*

To apply a pad and bandage to the wound, place a piece of lint or linen or a clean handkerchief folded into a hard pad, on the bleeding point, and secure it by a bandage tightly tied round the injured part To fold the handkerchief, bring the four corners to the centre, and repeat the process until a hard pad is formed The smooth surface is placed on the wound, and, to prevent the pad from unfolding, the puckered surface may be stitched or fixed by a safety pin A hard substance, such as a stone, may be enclosed in the centre of the pad

A tourniquet may consist of a pad to be placed on the pressure point, a strap, cord, or bandage to encircle the limb and pad, and a tightening arrangement, such as a stick or other means of twisting the band to tighten it

To improvise and apply a tourniquet :—

1. Apply a firm pad on the pressure point

2 Encircle the limb by a narrow bandage with its centre over the pad

3 Tie the ends of the bandage in a half knot on the opposite side to the pad

4. Lay the twisting stick on the half knot, and over it tie a reef knot.

5 Twist the stick to tighten the bandage, thereby pressing the pad upon the artery, and arresting the flow of blood

6 Lock the stick in position by the ends of the bandage already applied, or by another bandage passed round the stick and limb

The pad of the tourniquet must be accurately placed upon the pressure point so as completely to compress the artery, otherwise arterial blood will be allowed to pass along the limb, and the veins, being compressed by the tourniquet, will not allow the blood to return through them to the heart, and the result will be dangerous swelling and congestion

Should a suitable pad not be at hand a knot may be made in the centre of the bandage, and when available a stone, cork, etc , enclosed in it to give it firmness and bulk See that the bulging and not the flat side of the knot is next the skin

An elastic bandage, passed tightly round the limb, immediately above the seat of arterial hæmorrhage, will arrest bleeding The simplest prepared form of this bandage is a strip of elastic webbing, twenty-five to thirty inches long and two inches wide, with a piece of tape sewn at each end An elastic belt or brace will serve the same purpose Except when a part of a limb is torn off, it is not advisable to use an elastic cord or bandage if other apparatus can be had, as it cuts off all circulation in the limb

Flexion consists of the application on the pressure point at the knee or elbow joint, flexing the limb to make pressure, and securing the limb in the flexed position by a bandage crossed

General Rules for Treatment of a Wound Accompanied by Arterial Hæmorrhage.

1 Stop bleeding

2 Prevent injurious germs from getting into the wound

To attain these ends —

1 *Place the patient in a suitable position,* bearing in mind that the blood escapes with less force when the patient sits, and is still more checked when he lies down

2 *Elevate the bleeding part,* as thereby less blood finds its way into it.

3 *Expose the wound,* removing whatever clothing is necessary

4 *Apply digital pressure*—

(*a*) If the wound is small on the bleeding spot

(*b*) If the wound is large on the pressure point next to the wound on the heart side The nearest pressure point is chosen in order to avoid cutting off the circulation from as much of the part as possible, but sometimes it is necessary to apply pressure still nearer to the heart

5 *Remove foreign bodies,* such as broken glass, bits of clothing, hair, etc , seen in the wound, do not search for foreign bodies you cannot see

6 *Cover the wound with a clean and firm absorbent dressing* A hard dry pad of boracic gauze or lint is to be preferred, but absorbent cotton wool, lint, or gauze, or a clean piece of linen will answer the purpose Should any doubt be entertained as to the cleanliness of the dressing, a clean piece of unprinted paper, such as the inside of an envelope, should be placed next the wound before applying the pad

7 *Bandage tightly over the pad unless* —

(*a*) Foreign bodies are suspected to be left unseen in the wound

(*b*) There is danger of causing injury to a fracture

In these cases a light dressing only should be applied

8. *Apply a pad and bandage or flexion on the pressure point, but only in the following cases* (see Rule 4*b* ante) —

(*a*) As a temporary measure while the wound is being exposed, examined and covered

(*b*) As a more permanent measure when bleeding cannot be stopped by the pad and bandage on the wound, or when, in accordance with Rule 7, the tight bandage has not been applied.

9 *Afford support to the injured part* When part of a limb has been torn off or the wound is lacerated (for example, by the claw of an animal or by machinery), hæmorrhage does not frequently come on at once, but as there is a danger of severe hæmorrhage later, means for its arrest should be applied to the limb, but not tightened unless necessary.

Do not disturb a clot of blood over a wound.

No attempt should be made to cleanse a wound except with sterilised water (that is previously boiled and allowed to cool), and experience, especially in recent wars, has shewn that those wounds which were provisionally treated with a dry dressing and subsequently dressed by a surgeon with proper appliances did best

Venous Hæmorrhage

1 Blood from a vein is dark red

2 It flows in a slow continuous stream

3 It issues from the side of the wound further from the heart

4 In the case of a wound of a varicose vein it flows also from the side of the wound nearer to the heart, especially if the patient is kept standing

General Rules for Treatment of a Wound Accompanied by Venous Hæmorrhage

1 Place the patient in a suitable position, bearing in mind that the blood escapes with less force when the patient sits and is still more checked as he lies down

2 Elevate the part, as thereby less blood finds its way into it.

3 Expose the wound, removing whatever clothing is necessary

4 Remove any constrictions, such as the collar or garters, from the heart side of the wound

5 Apply digital pressure on the wound until you can apply a pad and tight bandage If that does not stop the bleeding, make pressure near the wound on the side away from the heart. In the case of a wound of a varicose vein it may also be necessary to apply a pad and bandage to the vein immediately above the wound, especially if the limb cannot be maintained in an elevated position

6 Treat the wound as directed by Rules 5, 6 and 7 for arterial bleeding.

7 Afford support to the injured part

Capillary Hæmorrhage

1 The blood is red

2 It flows briskly in a continuous stream, or may merely ooze from the wound

3 It wells up from all parts of the wound

A slight amount of pressure will suffice to arrest capillary hæmorrhage

Burns and Scalds

A burn is caused—

(*a*) By a dry heat, such as fire or a piece of hot iron.

(*b*) By a rail, wire or dynamo charged with a high-pressure electric current

(*c*) By a corrosive acid, such as oil of vitriol

(*d*) By a corrosive alkali, such as caustic soda, ammonia, or quicklime.

(*e*) By friction, caused, for example, by contact with a revolving wheel (brush burn)

A scald is caused by moist heat, such as boiling water, hot oil or tar.

The effect may be a mere reddening of the skin; blisters may be formed, or even the deeper tissues of the body may be charred and blackened The clothing may adhere to the burnt skin, and its removal is impossible without further detriment to the injured part The great danger is shock

Treatment 1 Carefully remove the clothing over the injured part If stuck to the skin, the adherent clothing must be cut round with scissors, soaked with oil, and left to come away subsequently

2 Do not break blisters

3 Immediately cover up the part Soak or smear pieces of lint or linen with oil, or vaseline, lanoline, or cold cream, a small quantity of boracic powder added to these will be of benefit The inside of a raw potato scraped out and spread on lint makes a soothing application When the injured surface is extensive do not cover it with one large sheet of lint, but with strips about the breadth of the hand, this is advisable as they fit better on the part, and during subsequent dressings one strip can be removed at a time and a fresh dressing applied before the adjacent strip is taken off The shock to the system is thereby less than if the whole of the burnt surface were laid bare to the air by the removal of all the dressings at one time When covered by the oily dressing, envelop the part in cotton wool or a piece of flannel and apply a bandage

When the face is burnt, cut a mask out of lint or linen, leaving holes for the eyes, nose and mouth Dip this in oil, or smear it with vaseline, and apply it to the face and cover it with cotton wool, leaving openings to correspond with the holes in the mask

When possible place the injured part in water at the temperature of the body (98 degrees) until suitable dressings can be prepared A dessert-spoonful of baking soda added to a basinful of warm water will make a soothing lotion

As it is important not to leave the part exposed to the air, it is the duty of the bystanders to prepare the dressings while the clothing is being removed

4 Treat shock This is particularly necessary in the case of every burn or scald of any considerable extent (see later) Be very apprehensive of danger in the case of even slight burns of the neck

5 If the burn is caused by a corrosive acid, bathe the part with a weak alkaline lotion, such as washing soda, baking soda (bicarbonate of soda), magnesia, or slaked lime in warm water before applying the dressings

6 If the burn is caused by a corrosive alkali, bathe the part with a weak acid lotion, such as lemon juice or vinegar diluted with an equal quantity of water *Caution* Before using water brush off any lime that remains on the part

7 When a woman's dress catches fire—

(*a*) Lay the woman flat on the floor at once, so that the flames are uppermost, that is to say, if the front of the dress is on fire lay her on her back, and if the back of the dress is burning, place her face downwards The reason for this is that flames ascend, so that if the upright position is assumed, the flames will quickly reach and burn the body, neck and face, or if the woman lies with the flames undermost, they will, if unextinguished, pass over and burn the limbs and set fire to the rest of the dress

(*b*) As soon as the woman is laid flat, smother the flames with anything at hand, such as a rug, coat, blanket, or table cover, if made wet, so much the better

(*c*) A woman rendering assistance should hold a rug or blanket in front of herself when approaching the flames (*d*) If a woman's dress catches fire when nobody is by, she should lie flat, flames uppermost, smother the flames with anything handy, and call for assistance, or crawl to the bell-pull and ring; on no account should she rush into the open air

Artificial Respiration

Professor Schäfer's Method

1 Waste no time in loosening or in removing clothing

2 Lay the patient in a prone position (i e, back upwards) with his head turned to one side, so as to keep his nose and mouth away from the ground No pad is to be placed under the patient, nor need the tongue be drawn out, as it will fall naturally

3 Kneel at one side, facing the patient's head, and place the palms of your hands on his lowest ribs, one on each side, the thumbs nearly touching one another in the small of the back Leaning your body forward, slowly apply firm but not violent pressure straight downwards upon the back and lower part of the chest, thus driving air out and producing expiration Draw back your body somewhat rapidly and relax the pressure, but do not remove your hands; this produces inspiration

4 Alternate these movements by a rhythmic swaying backwards and forwards of your body, twelve to fifteen times a minute, persevering until respiration is restored, or a doctor pronounces life to be extinct

Insensibility

Unconsciousness or insensibility may arise as follows

Injury to the head Concussion and compression of the brain

Disease of the brain Apoplexy, epilepsy, hysteria

Various causes Shock, fainting (syncope), collapse, alcoholic and other poisoning, sunstroke and heat stroke, infantile convulsions, asphyxia

General Rules for Treatment of Insensibility

1. If a person appears about to lose consciousness, prevent him from falling, and lay him gently down

2 Arrest hæmorrhage when apparent, attending to minor injuries is less important than treating the unconscious state

3 Lay the patient in the position in which breathing is most easy—usually this will be on the back, or inclined to one side As a general rule raise the head and shoulders slightly when the face is flushed, and keep the head low when the face is pale

4 Undo all tight clothing round the neck, chest and waist, unfastening the braces and top buttons of the trousers in men, and the corsets in women, the object being to relieve pressure on the air passages, lungs, heart and abdominal organs Be sure there is no obstruction to the air passages by the tongue or by a foreign body in the throat The possibility of false teeth obstructing breathing must be considered

5 Provide for a sufficiency of fresh air by opening doors and windows and by keeping back a crowd

6 When breathing cannot be discerned, apply artificial respiration

7 Obtain a doctor's help as soon as possible

8 Unless unavoidable, never leave the patient until you have placed him in charge of a responsible person

9 Give no food or fluids whatever by the mouth while the patient is insensible

10. Should the spine or important bone of the upper or of the lower limb be fractured, it must be steadied and

maintained at rest as soon as possible Should the unconsciousness be prolonged, the patient may be removed in a recumbent position to shelter, provided that the broken bone is adequately supported

11 When the patient is in a state of convulsion, support his head, and after wrapping a piece of wood or any other hard material in a handkerchief, hold it in his mouth to prevent biting of the tongue Do not forcibly restrain his limbs, prevent him from hurting himself by dragging him away from a source of danger, such as machinery, a wall, or fireplace, light pieces of furniture should be pushed out of the way

12 On return to consciousness water may be given to drink If the pulse is feeble give warm tea or coffee, provided hæmorrhage, either internal or external, is not present A desire to sleep should be encouraged, except in cases of opium poisoning, a condition that may be generally recognised by the history of the case, and also by the pupils of the eyes (the black openings in the grey, blue, or brown iris) being minutely contracted (pin-head pupils)

13 It must not be assumed that a person is insensible as the result of drink merely because the breath smells of alcohol, frequently when people are feeling ill they take, or are given, alcoholic stimulants, after which they may become insensible, not from the drink, but from the cause that induced them to take it—for example, insensibility coming on, effects of poisoning, etc Even if drink is believed to be the actual cause of insensibility, it must be borne in mind that the patient is in a very dangerous state, and he must be treated for collapse by being covered up and being kept warm.

The above general rules will enable first aid to be rendered efficiently in most cases of insensibility, although the exact form from which the patient is suffering is unknown

Shock, Fainting (Syncope), Collapse.

Treatment. 1 Remove the cause by arresting hæmorrhage, attending to injuries, loosening all tight clothing, especially about the chest and abdomen, removing from a close or crowded room, using encouraging words, etc.

2 Lay the patient on the back, with the head low Raise the lower limbs, when the patient is in bed, this is best done by raising the foot of the bedstead

3 Provide for a free circulation of fresh air

4 If hæmorrhage has been severe and the patient is collapsed, firmly bandage the limbs from the toes to the hips, and from the fingers to the arm-pits

5 To stimulate the action of the heart, sal volatile and water may be given if the patient can swallow, or smelling salts may be held to the nostrils

6 It is of the utmost importance to use every means of preventing a fall of temperature below the normal point To accomplish this cover the patient with extra clothing, or by placing rugs or blankets over him, get him to bed in a warm but well-ventilated room as soon as possible Apply warmth to the feet and to the pit of the stomach by hot-water bottles or hot flannels (test the heat of these with the elbow before applying them) If the patient can swallow, give hot drinks, such as milk, tea or coffee It is as well to add sugar, as it aids in raising the temperature of the body

7 If breathing cannot be discerned, apply artificial respiration.

8 If want of nourishment has been the cause of fainting or collapse, give food sparingly at first.

Asphyxia

When, owing to want of air, the blood is not supplied with oxygen, the patient becomes insensible, and is said to be asphyxiated This condition may be brought about as follows.—

1 Obstruction of the air passages—

(a) By drowning

(b) By pressure from outside strangulation, hanging, smothering

(c) By a foreign body in the throat choking

(d) By swelling of the tissues of the throat inflammation, scald of the throat, poisoning by a corrosive

2 Inhaling poisonous gases By coal gas (as used in the house), producer or water gas, smoke, fumes from a charcoal or coke fire, sewer gas, lime-kiln gas, carbonic acid gas

3 Pressure on the chest, as when crushed by sand or debris or by a crowd

4 Nervous affections, as the result of narcotic and certain other poisons, collapse, electric shock, or stroke by lightning

General treatment In all cases of asphyxia attempts must be made to remove the cause, or to remove the patient from the cause When this has been done artificial respiration must be applied, taking care that the air passages are not obstructed and that there is an abundance of fresh air

CHAPTER XXI.

MEN'S RECREATION.

RE BRIGADE COMPETITIONS—BEST MEANS OF ORGANISING—OPINIONS OF MR H S FOLKER AND CAPTAIN H MILLER, OF LEYTON—FIRE BRIGADE DINNERS

HE previous chapters have been entirely taken up with ity and hard work. I may be permitted, perhaps, in con-usion, to refer to a couple of subjects which are, in part at ast, of a recreative character.

The first of these has to do with *Fire Brigade Competitions*, which have now become a recognised form of recreation in connection with brigades When arranged amongst the members of a single brigade, they foster a valuable spirit of emulation amongst the members, especially when a challenge cup or something of the kind is given annually to the firemen who succeed in the drill The officers should not compete with their men Such competitions were first introduced by Braidwood at Edinburgh Fire engine trials between machines of different makers took place as early as Newsham's time, but I do not know of any time trials between firemen earlier than that of Braidwood In his account of the Edinburgh Fire Department, the latter says, "In order to excite a spirit of emulation, as well as to teach the men dexterity in working the engines, I frequently cause a competition amongst them They are ordered to attach one or more lengths of hose to each of two engines, and to work them as quickly as possible, the first engine which throws water being considered the winner. They are sometimes also placed at equal distances rom each of two separate firecocks On the call being given to move forward, each party starts for the firecock to hich it is ordered, and the first which gets into play is of course, held to have beaten the other." So that in the first real brigade established in Great Britain competitions were used as a means of increasing the efficiency of the members

When competitions are organised between various brigades, it is necessary to make careful arrangements to promote success. They ought, if possible, to be successful, not only financially, but also, as it were, professionally I have before me the opinions of two gentlemen who have been active in promoting competitions as to the best methods of organising these gatherings, and perhaps I cannot do better than reproduce here their observations on the subject

Mr H S Folker is so well known amongst Volunteer Fire Brigades that it is hardly necessary to mention that he occupied the post of Secretary of the National Fire Brigades Union for many years, and has had as much to do with the organisation of fire brigade competitions as any man in the country He writes —

"Since the introduction of the small 250-gallon steam fire engine by a well-known maker the manual engine is now almost an appliance of the past, and the rules and regulations for competitions have had to be revised to date 1911, and, from the experience of over 20 years of the N F B U , fire brigade officers will do well to adopt the rules and regulations for the National Competitions.

"The yearly progress made by the makers in improving engines, escapes, hose tenders, and chemical engines, often necessitates a revision of rules, and before many years all up-to-date fire brigades will have motor or electric appliances

"In arranging competitions the following should be remembered —

Ground.—See that the competition ground is fairly level and fill in all holes and roll.

Enclosure.—Should be roped or hurdled, and only officials and competitors allowed in same.

Water Supply—Ascertain the cost of providing water supply for drills, which sometimes proves a very great expense and ends in a financial loss

Engines.—Engines should be thoroughly examined and in good working order before handing over to the judges

Escapes—The greatest care should be taken to have the escapes thoroughly tested by experienced men before handing over to judges

Hose—Canvas hose of the best quality, with instantaneous couplings, standpipe and branches in duplicate

Hydrant—This should be fixed in the arena as near the dam as possible.

Judges—Two competent judges should be appointed for each drill, they must see that all the appliances are in good working order before the competitions begin Judges' decision is final

Timekeepers—Only first-class watches, thoroughly tested, should be used and again examined and certified by the judges before used by timekeepers

Penalties—Those used by the N F B U are recommended

Results—These should be posted up at regular periods for the benefit of the public and brigades.

Ambulance—Erect a small tent and have ambulance team on duty in case of accident to competitors or the public

House on Fire—Estimates from local builders should be obtained before giving the order, it often happens that the expense does not justify the erection of same and would make the competition a financial loss.

Grandstands.—As a rule they are a financial loss, and, therefore, not recommended

Gate Money—To draw a good gate you must have side shows and other attractions for the public Sell your tickets in advance and advertise by picture posters "

Captain Horatio Miller, of the Leyton and Leytonstone Fire Brigade, holds the following views :—

"My opinion as to Fire Brigade Competitions is that they are highly useful in maintaining efficiency amongst fire brigades The constant drilling that is necessary to enable the men to be in the running with other brigades is of tremendous assistance in keeping them fit, and the resultant proper handling of the appliances, when they attend a fire, is to the benefit of all concerned

"Do Fire Brigade Competitions pay? My personal experience of Annual Competitions in Leyton for upwards of twenty-five years is that during that period we have never experienced a monetary loss, on the contrary, they have been the means of purchasing one steamer, one escape, and a hose truck and appliances, which have been placed at Harrow Green—a portion of our district which was unprotected The secret of our continued success is that we do not depend solely on competition work for entertaining the public, but are assisted by other interesting events, such as military displays and sports of all kinds

"It is essential to ensure success to be careful in the following matters —

To form a small committee, consisting of men who take an interest in fire brigade work and who are enthusiasts in the brigade's welfare

The brigade which has the management of the undertaking should not compete

The appliances, hose, etc, should be in thorough working order

The judges appointed should be men of experience, none can be better than those who have taken part in competitions in years past.

Timekeepers should be men who have a reputation for accuracy in clocking, especially successful in this are men who have had to do with timing athletic sports "

At various times it has been attempted to make competitions a more complete test of firemen's capacity than they can be when confined to exercises in quick hitching The N.F B U of late years has introduced a contest in saving life apparently endangered, and other similar drills, with the time element considerably reduced in importance The difficulty, however, has been that competitors are usually of opinion that drills of this sort, in which superiority cannot be determined by the impartial judgment of the stop watch, leave too much authority in the hands of the judges, and organisers of competitions are sometimes too much afraid of dissatisfaction arising to venture upon anything of the sort

As well as the competition the annual dinner is now a recognised institution in all unpaid brigades These festivities are, in many provincial towns, of much greater importance than appears at first sight They afford an opportunity for assembling the gentry and influential tradespeople of the locality and of pouring into their willing ears the tale which most firemen have to tell of want of up-to-date engines, hose, uniform, and of balance at the banker's The tale of want touches the heart of the gentry and influential tradespeople when their appetites have been previously satiated, as it does at no other time The fact is well known to collectors for charitable institutions, of which noble army the Volunteer Fire Brigade collector is surely one, that an appeal made after dinner is successful as it is on no other occasion By a judicious officer the aspirations and needs of the brigade are enlarged upon, and its claims preferred in the best and most telling manner before those whose support is most especially to be looked for With the monied people of the locality and the representatives of the press around him, the captain tells the story of the work done during the year, the number of fires and drills attended, the life nobly saved by Fireman Smith, the small encouragement received from Insurance Companies, the extreme difficulty of raising funds, and the good use that could be made of a hundred pounds. Then some good friend, whose support at all times can be counted upon, makes a beginning with a promise of a five pound note, and is followed on the same side by several who on other occasions would give nothing at all. The funds of the brigade are benefited, and the uniform and apparatus that have been long wanted are obtained without the necessity of a house-to-house collection

The annual dinner serves this purpose, and others as well It brings the members of the brigade into contact with those whose unpaid and sometimes unappreciated servants they are The members themselves, too, are none the worse for meeting each other, and neighbouring firemen, under circumstances which do not foster the unfriendly rivalry which cannot always be excluded from competition meetings and from active work The opportunity is given for jealousies to be worn away, animosities to be smoothed over, and for the establishment and maintenance of good fellowship generally In fire brigades good feeling and good fellowship ought to be found as certainly as the hose and branchpipes—they are almost as necessary The annual dinner distinctly tends to promote them, and its effect in this direction often continues long after Tom Collins has ceased to be congratulated upon the merit of his gastronomic performance, and even when the junior member, who responded for the ladies, has forgotten the strain upon his nervous system caused by the breakdown of his maiden speech

THE END

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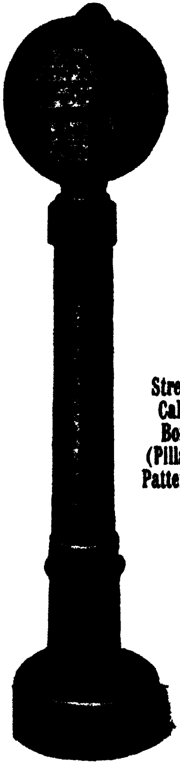

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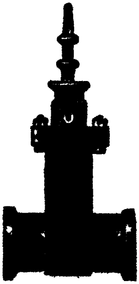

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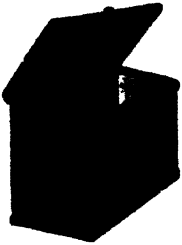

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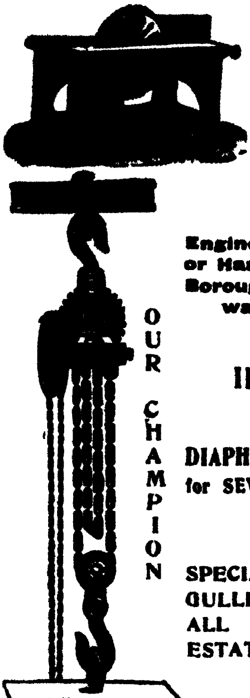

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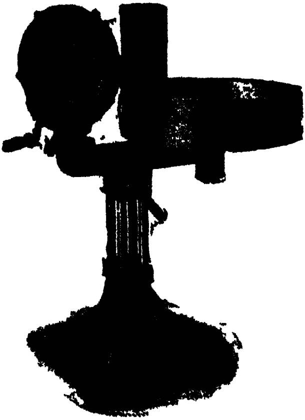

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